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MAR 1 3 2020

Ms. Sharon Hartzell
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Mr. Brian Jankauskas
New York State Department of
Environmental Conservation
Division of Environmental Remediation
625 Broadway -12th Floor
Albany, New York 12233

Dear Ms. Hartzell and Mr. Jankauskas:

SUBJECT: BROOKHAVEN NATIONAL LABORATORY (BNL) INTERAGENCY AGREEMENT (IAG): 2019 ENVIRONMENTAL MONITORING REPORT CURRENT AND FORMER LANDFILL AREAS

Attached please find two copies of the subject document for your review, comment, and approval. The following outlines the key points of the report.

Current Landfill:

- Landfill gasses are not migrating to any buildings.
- Elevated levels chloroethane, 1,1-dichloroethane and benzene continue to be detected downgradient of the landfill. These concentrations are naturally attenuating and are not detected at the site boundary above the drinking water standard.
- There have been no detections of radionuclides above the drinking water standards since 1998.

Former Landfill:

- Landfill gasses were not detected.
- Five monitoring wells were sampled during 2019 for Sr-90. Sr-90 levels remained below the groundwater standard of 8pCi/L.

- The next full round of sampling, which include VOCs, pesticides/PCBs, general chemistry, metals, and radionuclides is scheduled for 2020.

If you have any questions please contact Jerry Granzen, of my staff, at (631) 344-4089. We will brief you on the conclusions of this report during the upcoming April IAG teleconference.

Sincerely,

Robert P. Gordon
Site Manager

Attachment:
2019 Landfill Report

cc: W. Parish, NYSDEC
A. Rapiejko, SCDHS
G. Granzen, SC-BHSO
S. Coleman, BSA
W. Dorsch, BSA
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BROOKHAVEN
NATIONAL LABORATORY

BROOKHAVEN NATIONAL LABORATORY 2019 ENVIRONMENTAL MONITORING REPORT CURRENT AND FORMER LANDFILL AREAS

Prepared by

Brookhaven National Laboratory
Environmental Protection Division
Upton, New York

February 28, 2020

BROOKHAVEN NATIONAL LABORATORY
2019 ENVIRONMENTAL MONITORING REPORT
CURRENT AND FORMER LANDFILL AREAS

Executive Summary

This report documents the Operations and Maintenance activities undertaken during calendar year 2019 for the Current Landfill (Area of Concern [AOC] 3) and the Former Landfill Areas. The Former Landfill Areas include the Former Landfill (AOC 2A), Interim Landfill (AOC 2D), and Slit Trench (AOC 2E). Brookhaven National Laboratory is responsible for performing this work to comply with the post-closure O&M requirements specified in 6 New York State Code of Rules and Regulations (NYCRR) Part 360, Solid Waste Management Facilities, updated November 4, 2017. The landfill caps are functioning as designed and the 2019 results are consistent with results from previous years.

The groundwater quality at both the Current and Former Landfill Areas remains relatively unchanged from 2018. Volatile organic compounds (VOCs) and metals continue to be detected downgradient of the Current Landfill. The most prevalent VOCs detected above NYSDEC Class GA Groundwater/Guidance Values are chloroethane, 1,1-dichloroethane and benzene, at maximum concentrations of 15.1 micrograms per liter (µg/L), 5.32 µg/L and 2.44 µg/L, respectively. As with previous years, aluminum, iron, manganese, and sodium were detected downgradient from the Current Landfill at concentrations above applicable standards. Concentrations of these metals were similar to those detected historically. Maximum concentrations of aluminum, iron, manganese, and sodium in downgradient wells were 263 µg/L, 88,000 µg/L, 5,080 µg/L, and 47,600 µg/L, respectively. These results are an indicator of continued low-level leachate generation at this landfill. There were no detections of radionuclides above standards at the Current Landfill during 2019.

Strontium-90 concentrations in all Former Landfill area monitoring wells were below the groundwater standard of 8 pCi/L during 2019. Strontium-90 has not been detected above the standard of 8 pCi/L in Former Landfill monitoring wells since 2001. The only detectible strontium-90 concentration was found in well 106-44 at 3.18 pCi/L.

The groundwater monitoring well networks for the Current and Former Landfill Areas are adequate at this time. VOCs will continue to be monitored quarterly in Current Landfill wells 088-109 and 098-99 and strontium-90 will continue to be monitored annually in the five Former Landfill monitoring wells.

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ACRONYMS

AOC	Area of concern
BNL	Brookhaven National Laboratory
BSA	Brookhaven Science Associates
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act
CY	Calendar year
DCS	Derived concentration technical standard
DOE	U.S. Department of Energy
DQOs	Data quality objectives
EIMS	Environmental Info. Mgmt. System
HWMF	Former Hazardous Waste Management Facility
LEL	Lower explosive limit
µg/L	Micrograms per liter
mg/L	Milligrams per liter
mrem	Millirem
MS/MSDs	Matrix spike/matrix spike duplicates
NPL	National Priorities List
NYSDEC	NY State Dept. of Environmental Conservation
NYSDOH	NY State Dept. of Health
O&M	Operations and Maintenance
OU	Operable Unit
PCBs	Polychlorinated biphenyls
pCi/L	Picocuries per liter
QA/QC	Quality Assurance/Quality Control
QAPP	Quality Assurance Project Plan
SCDHS	Suffolk County Department of Health Services
Sr-90	Strontium 90
TDS	Total dissolved solids
TKN	Total Kjeldahl nitrogen
TSS	Total suspended solids
TVOCs	Total volatile organic compounds
UEL	Upper explosive limit
USEPA	United States Environmental Protection Agency
VOCs	Volatile organic compounds

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1.0 INTRODUCTION

This report documents the Operation and Maintenance (O&M) activities and summarizes monitoring data collected during calendar year (CY) 2019 for the Current Landfill (Area of Concern [AOC] 3) and the Former Landfill Areas (Former Landfill AOC 2A, Interim Landfill AOC 2D, and Slit Trench AOC 2E). Brookhaven National Laboratory (BNL) is responsible for performing this work to comply with the post-closure O&M requirements specified in the 6 New York State Code of Rules and Regulations (6NYCRR) Part 360, Solid Waste Management Facilities, revised November 4, 2017. The details of the O&M programs are described in the Final Operations and Maintenance Manuals for the Current Landfill (CDM Federal, 1996a) and the Former Landfill Areas (CDM Federal, 1996c).

The following are the primary objectives of the O&M program:

- Monitor the effectiveness of the impermeable caps in protecting groundwater quality;
- Monitor the potential generation and migration of soil-gas; and
- Maintain and monitor the various components of the closure system (e.g., landfill caps, drainage structures, and environmental monitoring systems).

This is the twenty-fourth year of O&M for the Current Landfill, the twenty-third year for the Former Landfill and Slit Trench, and the twenty-second year for the Interim Landfill.

1.1 Site Description and Project Background

BNL is a 5,265-acre site located in central eastern Long Island, New York. The facility is a federally owned and funded international research and learning center managed by Brookhaven Science Associates (BSA) under contract with the United States Department of Energy (DOE). On December 21, 1989, the site was placed on the United States Environmental Protection Agency's (USEPA's) National Priorities List (NPL), a ranking of hazardous waste sites compiled by the federal government as part of the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA). Placing BNL on the NPL resulted in the establishment of a remediation task list for

various locations around the facility. The site subsequently was divided into seven separate remediation work areas known as Operable Units (OU). The Current Landfill and Former Landfill Areas are located in OU I, near the south-central portion of the BNL site **(Figure 1)**.

Current Landfill. The Current Landfill consists of one unlined waste-cell that operated from the late 1960s until 1990 for disposing of waste generated at the Laboratory. An impermeable cap covering the cell was completed in November 1995. Additional information about the cap's construction can be obtained from the *Construction Certification Report for the Current Landfill* (CDM Federal, 1996b). Following the installation of the cap, the post-closure groundwater monitoring program was implemented in January 1996, in compliance with 6 NYCRR Part 360 Section 2.15, Solid Waste Management Facilities.

Groundwater quality near the Current Landfill is monitored under the O&M program for a wide variety of volatile organic compounds (VOCs), metals, radiological, and water chemistry (landfill leachate) parameters. Monitoring in this vicinity was expanded in 1999 to include a wetland area adjacent to the landfill's eastern boundary. This area, known as the Wooded Wetland area, is a two-acre wetland located between the Former Hazardous Waste Management Facility (HWMF) and the Current Landfill. The wetland receives surface runoff from the Current Landfill and usually is flooded during the spring/early summer and dry in late summer/fall. Monitoring of the Wooded Wetland area was incorporated into the Current Landfill Monitoring Program and consisted of sampling and analyzing surface water and sediment annually through 2008, and then every other year to evaluate the potential for leachate migrating into this area, as originally performed under the *OU I Ecological Risk Assessment* (CDM Federal, 1999). In response to information provided in the *2015 Environmental Monitoring Report, Current and Former Landfill Areas* (BNL 2016) and additional tiger salamander information provided upon the request of the NYSDEC, it was agreed that further monitoring of the Wooded Wetlands would be limited to visual tiger salamander assessments. Furthermore, it was agreed to that no further sediment and surface water samples will be collected, and care would be taken by BNL to not disturb the buildup of detritus material in the Wooded Wetland.

As required under 6 NYCRR Part 360, groundwater quality must be monitored for a minimum of five years, after which the permittee may request modification of the sampling and analysis

requirements. In October 2001, BNL submitted the *Five-Year Evaluation Report for the Current Landfill* (BNL, 2001b). This report assessed groundwater trends over the five years after capping, and proposed changes to the sampling program. These changes were implemented in CY 2002. In July 2006, March 2011 and June 2016, BNL issued the additional five-year review reports which discussed all remediation areas at the site, including the current landfill (BNL 2016, BNL 2011, BNL 2016).

Former Landfill Area. The Former Landfill Area encompasses three closely located landfill units; the Former Landfill, the Slit Trench, and the Interim Landfill. The Former Landfill is an unlined waste-disposal area originally used by the United States Army starting in 1918. Waste disposal operations ceased in 1966, and the landfill was covered with soil. The Interim Landfill also is unlined and was reportedly used for approximately one year between the time the Former Landfill was closed and the Current Landfill was opened. The Slit Trench is unlined as well and is believed to have operated between 1960 and 1967 for disposal of construction and demolition debris (CDM Federal, 1996c).

The Former Landfill and Slit Trench were capped in November 1996 and the Interim Landfill was capped in October 1997. Additional information about the construction of the caps can be found in the *Construction Certification Report for the Former Landfill* (Roy F. Weston, 1997) and *Construction Certification Report for the Interim Landfill Capping* (PW Grosser, 1997). BNL started O&M activities in December 1996 at the Former Landfill and Slit Trench, and in November 1997 at the Interim Landfill. Under this O&M program, groundwater quality in downgradient wells near the Former Landfill is monitored for VOCs, metals, radionuclides, and landfill-leachate parameters.

In March 2002, BNL submitted a *Five-Year Evaluation Report for the Former Landfill* (P.W. Grosser, 2002), which assessed trends in groundwater quality over the five-year period following capping and proposed changes to the sampling program. These changes were implemented in CY 2003. In July 2006, March 2011 and June 2016 BNL issued the additional five-year review reports which discussed all remediation areas at the site including the Former Landfill areas (BNL 2016, BNL 2011, BNL 2016).

1.2 Overview of the Monitoring Program

Groundwater Monitoring

Data quality objectives (DQOs) for each of BNL's groundwater monitoring programs are presented in the *BNL Environmental Monitoring Plan* (BNL, 2019). The design of the data collection network was optimized as part of the process. Such optimization continues annually as part of the O&M program and is based on the interpretation of new data as well as historical trends. The primary DQO decision identified for the landfill monitoring programs is "Are the controls effectively improving groundwater quality below and downgradient of the landfill?"

Groundwater samples are collected from monitoring wells positioned upgradient and downgradient of each landfill area. Analytical data are reviewed, and determinations are made regarding the effectiveness of landfill controls.

The additional monitoring programs for the landfill areas consist of:

Soil-gas Monitoring. Measurements of methane, Lower Explosive Limit (LEL), and hydrogen sulfide are taken quarterly from monitoring locations surrounding the Current Landfill and annually from monitoring locations surrounding the Former Landfill to evaluate the movement of soil-gas from the landfills.

Routine Visual Inspection, Maintenance, and Repair. Monthly inspections are performed to monitor the structural and/or operational status of the landfill caps, drainage structures, and environmental monitoring systems. Semi-annual inspections of the landfills are also performed to ensure that institutional controls continue to be maintained.

Leachate Discharge. Visual inspections of the landfills are performed monthly to monitor for signs of leachate discharge. If observed, samples of the leachate are collected and analyzed. Leachate was not observed during 2019.

These activities are discussed in greater detail in **Sections 2 through 4** of this report. **Section 5** contains the conclusions and recommendations. References are included in **Section 6**.

2.0 GROUNDWATER MONITORING

2.1 Monitoring Well Networks

2.1.1 Current Landfill

Since January 1996, groundwater quality at the Current Landfill has been monitored using eleven downgradient wells and one background monitoring well. **Figure 2** depicts the location of the monitoring wells. **Figure 3** shows the water table contours for this area in January 2020. The depths of the screen intervals for the Current Landfill wells and fourth quarter depth to water elevations are listed below.

Well ID	Depth to Water (ft BLS) 4th Q 2019	Screen Interval (ft BLS)	Screen Zone
087-09*	25.08	24–34	Shallow Glacial
087-11	12.94	11–21	Shallow Glacial
087-23	31.32	25–40	Shallow Glacial
087-24	31.23	70–80	Middle Glacial
087-26	11.74	70–80	Middle Glacial
087-27	11.86	5–20	Shallow Glacial
088-109	10.30	6–21	Shallow Glacial
088-110	12.22	10–25	Shallow Glacial
088-21	6.46	5–20	Shallow Glacial
088-22	6.69	70–80	Middle Glacial
088-23	6.52	120–130	Deep Glacial
098-99	9.27	39.5-49.5	Middle Glacial

BLS = Below Land Surface

*Background well

2.1.2 Former Landfill

Since January 1997, groundwater quality at the Former Landfill area has been monitored using 14 shallow monitoring wells (three background and 11 downgradient). The locations of the 14 monitoring wells are presented in **Figure 4**. The direction of groundwater flow in the OU I area of the site is generally to the south-southeast. **Figure 3** shows the January 2020 water table contours for the area. The screen zones for Former Landfill Area wells are summarized below.

Well ID	Depth to Water (ft BLS) 4th Q 2019	Screen Interval (ft BLS)	Screen Zone
086-42*	NS	65–75	Middle Glacial
086-72*	NS	41.5–56.5	Shallow Glacial
087-22*	NS	43–53	Shallow Glacial
097-17	NS	29–39	Shallow Glacial
097-64	32.31	29–44	Shallow Glacial
097-277	NS	40–55	Shallow Glacial
106-02	28.15	55–65	Middle Glacial
106-30	NS	29–44	Shallow Glacial
106-20	NS	85-95	Middle Glacial
106-21	NS	55-65	Shallow Glacial
106-43	27.04	43-53	Shallow Glacial
106-44	26.93	44-54	Shallow Glacial
106-45	26.97	44-55	Shallow Glacial
106-64	NS	30-40	Shallow Glacial

BLS = Below Land Surface
*Background well
NS = Not sampled in 2019

2.1.3 Sampling Frequency and Analytical Parameters

The majority of monitoring wells for the Current Landfill were sampled semiannually, during June and December 2019, for VOCs, metals, and water chemistry parameters. A quarterly VOC sampling frequency was maintained for wells 088-109 and 098-99, due to the continued presence of elevated levels of chloroethane. Samples were analyzed for radionuclides once during 2019 for wells 087-23, 087-27, 088-21, and 088-109.

Former Landfill Area wells are scheduled to be sampled every two years. However, as recommended in the *2016 Environmental Monitoring Report, Current and Former Landfill Areas* (BNL, 2017), the sampling frequency for Sr-90 was increased to annually for wells 097-64, 106-02, 106-43, 106-44, and 106-45. All other wells and parameters, which include VOCs, pesticides/PCBs, general chemistry, metals and radionuclides, are scheduled to be sampled in 2020.

The BNL sampling team conducted the groundwater sampling, and General Engineering Laboratories, Inc of Charleston, South Carolina analyzed the samples. Groundwater samples were collected using BNL procedure EM-SOP-302, *Groundwater Sampling-Low Flow Purging and Sampling Using Dedicated Bladder Pumps.* See **Table 1** for a summary of analyses performed, by

well and sampling round.

2.1.4 Quality Assurance / Quality Control

The groundwater samples were collected and analyzed in accordance with strict quality assurance/ quality control (QA/QC) requirements as described in the BNL standard operating procedures (SOPs) for groundwater monitoring. The analytical results for groundwater samples collected during 2019 satisfied the data-quality objectives. Furthermore, a master calibration/maintenance log is maintained for each field-measuring device (e.g., pH, conductivity, turbidity meters).

The analytical results of samples collected for the Current and Former Landfill Area projects underwent data verification, using EM-SOP-203, *Chemical Data Verification*, and EM-SOP-204, *Radiochemical Data Verification*. These procedures are designed to verify the accuracy and/or completeness of analytical data. The data verification process is implemented to detect the most common analytical problems that affect the quality of the results. To accomplish this task, QA/QC items such as the following were checked: holding times, matrix spikes, laboratory and field blanks, and field logs. If items are found that can affect the use and interpretation of the data, they are either corrected, as in the case of unreadable information on the field logs, or the data are "qualified," as in the case of contamination of the blanks or violations of the holding time.

Guidance on the collection of QA/QC samples is contained in the QAPP, and in BNL procedure EM-SOP-200, *Collection and Frequency of Field Quality Control Samples*. The QA/QC samples collected included trip blanks, field blanks, matrix spike/matrix spike duplicate (MS/MSDs), and blind duplicates.

Trip blanks were analyzed for aqueous VOCs only. One trip blank was shipped to the analytical laboratory with each set of samples submitted for VOC analyses. The results of the blank samples did not indicate any significant impact on the quality of the results. One duplicate sample was collected from the Current Landfill during the first, second, third and fourth quarters. No inconsistencies were detected in the blind duplicate analyses. The results are indicative of consistency with contract analytical laboratories and sampling methods, resulting in valid, reproduceable data. Matrix spike/matrix spike duplicate (MS/MSD) samples were collected at the same frequency as the duplicates. Samples submitted for nitrate and nitrite analysis during the

second quarter were analyzed outside their respective holding times. The data has been qualified for the samples that were affected by this exceedance and subsequently denoted in the respective data tables. Furthermore, chloride results are absent for the second quarter due to a login error at the analytical lab, therefore no samples were obtained and are represented as such in the data tables. Fourth quarter Arsenic values have also been qualified due to the presence of this analyte in the associated Field Blank. Data for arsenic has been qualified in some cases with detection limits above the groundwater standard and therefore out of abundance of caution will not show as exceedance for the affected wells 087-23 and 088-110. The amount of qualified data was within acceptable limits and did not adversely impact the review of the groundwater quality.

2.2 Landfill Groundwater Monitoring Results

This section summarizes the 2019 results for VOCs, metals, water-chemistry parameters, and radionuclides detected for both the Current Landfill and radionuclide results from the Former Landfill Area. The historical trends in concentrations of key contaminants are assessed and shown graphically in **Figures 5 through 9**. Summary tables of all 2019 landfill groundwater data are presented in **Tables 2 through 6**. Detections that exceed groundwater standards are in bold text. The tables include groundwater standards, laboratory results, minimum detection limits, and laboratory data qualifiers.

The groundwater standards used for evaluating nonradiological groundwater data are those contained in the NYSDEC Division of Water Technical and Operational Guidance Series 1.1.1 Ambient Water Quality Standards and Guidance Values (June 1998, with addendums April 2000 and June 2004) (NYSDEC 1998, 2000, and 2004) and 6NYCRR Part 703.5. Groundwater standards for radiological isotopes were supplemented with New York State Department of Health's (NYSDOH's) strontium-90 and tritium standards for drinking water. There were no groundwater standards for the gamma constituents; therefore, a Groundwater Screening Level was used. This value is based on a dose equivalent of 4 millirems (mrem)/year and was calculated as 4% of the DOE Derived Concentration Technical Standards (DCS) (DOE-STD-1196-2011) for the isotope of concern. These values are listed under the "groundwater standards" column in the summary tables and annotated where appropriate. Laboratory results that exceed the lower of the groundwater standards or the Cleanup Goals listed in the Record of Decision (ROD) are highlighted in the data summary tables to facilitate review of the information.

The laboratory data qualifiers included in the tables vary for the different analyses. Explanations for the data qualifiers are included in the notes in each table. Complete 2019 laboratory data reports, chain of custody forms, and well-sampling logs for both landfills are archived and available upon request. In addition, analytical results are stored in the BNL Environmental Information Management System (EIMS) database.

2.2.1 Current Landfill

2.2.1.1 Volatile Organic Compounds (VOCs)

Benzene and chloroethane have historically been the primary groundwater contaminants detected downgradient of the Current Landfill. Benzene was detected above its standard of 1 microgram per liter (μg/L) in monitoring well 087-11 and 088-110. 1,1-Dichloroethane was detected above the groundwater standard of 5 μg/L in downgradient monitoring wells 088-109 during 2019 **(Table 2)**. Chloroethane was detected in wells 088-22, 088-109 and 088-110 above the groundwater standard of 5 μg/L. No other VOCs were detected above groundwater standards during 2019.

Benzene exceeded the 1 μg/L standard in well 087-11 during the June 2019 and December 2019 sampling events, with a maximum concentration of 2.44 μg/L. Well 088-110 exceeded the benzene standard during the December 2019 sampling event with result of 1.01 μg/L. Chloroethane exceeded the 5 μg/L standard in wells 088-22, 088-109 and 088-110 during 2019. Chloroethane exceeded the standard in wells 088-22 for December and well 088-109 in September with a concentration of 15.1 μg/L and 14.9 μg/L respectively. Well 088-110 exceeded the standard in both sampling events with a concentration of 8.91 μg/L in June and 10.3 μg/L in December. The maximum chloroethane concentration of 15.1 μg/L was detected in well 088-22 during the December sampling event, which is well below the historic high of 313 ug/L detected in this well in 1997. 1,1-Dichloroethane was detected above the standard of 5 μg/L in well 088-109 during the September sampling event with a maximum concentration just above the standard at 5.32 μg/L. There is no apparent seasonal or water table elevation correlation with VOC concentrations in this well based on an assessment of historical data.

Figure 5 plots the concentration trends of total VOCs (TVOC), benzene, and chloroethane. Overall, the trend plots also show a distinct decrease in VOC concentrations from the high concentrations

seen prior to the installation of the cap. This reflects the positive effects of the capping on the groundwater quality downgradient of the landfill.

2.2.1.2 Water Chemistry Parameters

Groundwater samples near the Current Landfill were analyzed semi-annually for ammonia, total Kjeldahl nitrogen (TKN), cyanide, sulfate, nitrite, nitrate, total nitrogen, chloride, alkalinity, total dissolved solids (TDS or residue, nonfilterable), and total suspended solids (TSS or residue, filterable) during 2019. The results are provided in **Table 3**. Elevated levels of these parameters can be indicative of the presence of landfill leachate. A comparison of downgradient and background wells shows that leachate continues to be generated from the Current Landfill, albeit at low concentrations. Decreasing to stable trends in concentrations of contaminants indicate that the capping continues to effectively reduce the generation and migration of leachate.

During 2019, ammonia was the only water chemistry parameter detected above standards. Ammonia was detected above the standard of 2 milligrams per liter (mg/L) in well 087-11 at its highest concentration at 5.2 mg/L in June 2019 **(Table 3)**. The levels of ammonia detected in downgradient wells are consistent with historic data.

Chloride was not detected above the standard of 250 mg/L in any wells in 2019. Downgradient well 087-21 had the highest concentration of chloride at 60.4 mg/L. **Figure 6** plots the trends for alkalinity and chloride. The trends for downgradient wells show low levels of chloride concentrations near the Current Landfill. The historical concentration trends plotted show overall stable to decreasing levels of chloride.

Alkalinity, in the form of bicarbonate, is the concentration of anions available to neutralize acid, and is often used as an indicator of leachate contamination. The alkalinity in background well 087-09 ranged from 25.5 mg/L to 36.6 mg/L. The highest alkalinity concentration during 2019 was detected in downgradient, shallow Upper Glacial aquifer well 087-11, at 168 mg/L. There is no groundwater standard for alkalinity. The historical concentration trends plotted in **Figure 6** show overall stable to decreasing levels of alkalinity.

During 2019, all sulfate concentrations remained below the groundwater standard of 250 mg/L. The highest sulfate value reported for 2019 was detected in the December sample from monitoring well

088-109 at a concentration of 21.4 mg/L. This is consistent with historic background levels at the Current Landfill.

TDS and TSS results were similar to those from previous years. TDS and TSS concentrations in background well 087-09 ranged from 150 mg/L to 94.3 mg/L, and 4.2 to 7.6 mg/L, respectively. The maximum concentrations observed in downgradient wells were 296 mg/L and 49 mg/L of TDS and TSS, respectively.

No water chemistry parameters have exceeded groundwater standards in downgradient wells 087-24, 088-22, and 088-23, since 1998. These wells are all screened in the mid to deep-Upper Glacial aquifer to monitor the vertical extent of contamination from the Current Landfill.

2.2.1.3 Metals

Historically, iron is detected consistently above groundwater standards in the upgradient well, and the majority of downgradient wells surrounding the landfill. Precipitated iron from the BNL Water Treatment Plant was disposed of at the Current Landfill during past operations. However, metals concentrations in upgradient well 087-09 are still lower than in several downgradient wells, suggesting continued leachate migration from the landfill into the groundwater.

During 2019, iron and chromium exceeded their respective groundwater standards in the background well 087-09. Aluminum, iron, manganese, and sodium exceeded their respective groundwater standards in several downgradient wells **(Table 4)**.

Aluminum was reported above the standard of 200 µg/L in downgradient well 088-21 at a maximum concentration of 263 µg/L. This result is consistent with historic results reported for several Current Landfill wells, including background well 087-09.

Iron was reported above the standard of 300 µg/L in wells 087-09, 087-11, 087-23, 087-27, 088-109, 088-110 and 088-21. The background concentrations ranged up to 2,680 µg/L while downgradient concentrations ranged up to 88,000 µg/L in well 087-11. Well 087-11 has shown decreasing iron concentrations since the fourth quarter 2018. Iron trend graphs are plotted on **Figure 7**.

Manganese was detected above the standard of 300 µg/L in wells 087-11, 087-23, 087-27, 088-109 and 088-110. Manganese ranged from 93.1 µg/L to 134 µg/L in background well 087-09, and up to 5,080 µg/L in the downgradient well 087-27.

Sodium was detected above the standard of 20,000 µg/L in wells 087-11, 087-24, 087-26, 087-27, 088-110 and 088-21. Downgradient sodium levels ranged up to 47,600 µg/L in well 088-21.

Chromium was detected above the standard of 50 µg/L in background well 087-09 at concentrations up to 79.8 µg/L. Historical data shows consistent exceedances of chromium within this upgradient well. However, chromium was not detected above the standard in any of the downgradient wells.

2.2.1.4 Radionuclides

No radionuclides were detected above groundwater standards for strontium-90, tritium and gamma constituents during 2019 **(Table 5)**. Strontium-90 was the only radionuclide detected during 2019. Strontium-90 was detected below the groundwater standard of 8 pCi/L with a concentration of 1.33 pCi/L in well 088-21. As noted in **Section 2.2**, there are no groundwater standards for the gamma constituents; therefore, a groundwater screening level was used for comparison purposes. **Figure 8** shows the historical strontium-90 and tritium concentration trends for the four wells sampled.

2.2.2 Former Landfill

Based on changes recommended in the *2012 Environmental Monitoring Report, Current and Former Landfill Areas* (BNL,2013), monitoring wells are scheduled to be sampled every two years. However, the Sr-90 sampling frequency for wells 097-64, 106-02, 106-43, 106-44, and 106-45 is annual. All wells were sampled in 2019.

2.2.2.1 Radionuclides

The sampling results for the former landfill are summarized in **Table 6**, and concentration trend plots for Strontium-90 are shown on **Figure 9**. During 2019, strontium-90 was only detected in well 106-44 at a concentration of 3.18 pCi/L. Strontium-90 has not been detected above the standard of 8 pCi/L in the Former Landfill monitoring wells since 2001.

3.0 SOIL-GAS MONITORING

3.1 Soil-gas Monitoring Networks

Soil-gas readings were collected from wells surrounding the Current Landfill in April, June, September, and December 2019 and from the Former Landfill in August 2019. Methane, lower explosive limit (LEL), and hydrogen sulfide were measured using a Landtec® GEM 2000. The LEL for methane is 5.3% and the upper explosive limit (UEL) is 15%.

3.1.1 Current Landfill

Along the perimeter of the Current Landfill, 58 points were sampled for soil-gas, which includes four outpost soil-gas well clusters, GSGM-1 to GSGM-4, located along the south side of Brookhaven Avenue. The sampling points include 12 soil-gas well clusters consisting of three sampling intervals per cluster, and 11 soil-gas well couplets consisting of two sampling intervals per couplet. **Table 7** describes each soil-gas well adjacent to the landfill. Their locations are illustrated on **Figure 10**.

3.1.2 Former Landfill Area

Twenty-four sampling points were monitored for the Former Landfill Area. These points include 12 well couplets consisting of two sampling points per couplet. Details of each soil-gas well are given in **Table 7** and their locations shown in **Figure 11**.

3.1.3 Sampling Frequency

Soil-gas was monitored for each landfill in the following months.

Sampling Event	Current Landfill	Former Landfill
Round 1	April 2019	August 2019
Round 2	June 2019	None
Round 3	September 2019	None
Round 4	December 2019	None

3.2 Results of Soil-Gas Monitoring

Action levels for soil-gas are specified in 6 NYCRR Part 360-2.17(f) in terms of percent LEL, which is primarily related to the amount of methane present. This discussion focuses primarily on the methane levels detected during monitoring. Hydrogen sulfide is monitored but has no regulatory action level. 6 NYCRR Part 360-2.17(f) specifies that active measures to control decomposition gases are required when the concentration of methane or other explosive gases exceeds 25 percent of the LEL (or 1.3% methane) in facility structures, or 100 percent (%) of the LEL (or 5.3% methane) at the site boundary.

3.2.1 Current Landfill

A total of 23 soil-gas monitoring well clusters are positioned around the Current Landfill **(Figure 10)** and were sampled quarterly during 2019. Potential receptors, or areas where methane can accumulate near the Current Landfill, include the National Weather Service office building located 480 feet north northwest of the Current Landfill on the north side of Brookhaven Avenue. Four outpost soil-gas locations, GSGM-1 to GSGM-4, are located along the south side of Brookhaven Avenue, and are used to monitor the northern extent of the migration of landfill gas. Should methane extend to the south side of Brookhaven Avenue at concentrations exceeding 25 percent of the LEL (or 1.3% methane), active measures may be required to control its migration. This is a BNL administration limit that would trigger further evaluation.

The results of the soil-gas monitoring for 2019 are summarized in **Table 8**. **Appendix A** contains the field notes recorded during the sampling events. Instrument measurements show that methane continues to be generated in several areas of the landfill. The percent of the LEL is elevated along the western side and the southeast boundary of the Current Landfill. In addition, SGMW-19 along the northern side of the Current Landfill had elevated LEL readings in only one of its quarterly sampling events. The LEL readings in these areas have remained stable since 1996 when monitoring began. The current gas venting system appears to be effective in controlling gas accumulation. These data are consistent with previous years.

Outpost wells, GSGM-1 to GSGM-4, located along the south side of Brookhaven Avenue and immediately upgradient of the landfill showed no methane during 2019, indicating that the methane accumulation and migration does not extend to this area. Should methane, at concentrations exceeding 25 percent of the LEL (or 1.3% methane) extend to these outpost wells on the south side of Brookhaven Avenue, active measures may be required to control its migration.

Hydrogen sulfide is a product of anaerobic decay in landfills and can produce an odor like rotten eggs. It is a nuisance, but rarely a toxicity problem. For reference, the National Institute of Occupational Safety and Health sets an exposure limit of 10 parts per million (ppm) hydrogen sulfide in the breathing zone for an 8-hour period.

Hydrogen sulfide measurements collected from the soil-gas monitoring wells ranged from 0 ppm to 45 ppm. Well SGMW-02B located along the west section of the landfill, had the highest hydrogen sulfide concentration of 45 ppm, which was above the 10 ppm exposure limit. However, the measurement was taken from a vapor point screened 10.5 to 16 ft below the surface, and not from the ambient breathing zone. Elevated hydrogen sulfide was also detected in well SGMW-03B, which is screened 10.5 to 17 ft below the surface at a concentration of 30 ppm. Like methane, receptors to hydrogen sulfide are considered to be in areas such as basements where the gas can accumulate. Based upon the readings obtained from the outpost soil-gas wells along the south side of Brookhaven Avenue (GSGM-1 to GSGM-4), there is no evidence that hydrogen sulfide is migrating toward the National Weather Service building.

3.2.1.1 Trend in Soil-Gas Data

Historically the levels of methane and hydrogen sulfide in the wells along the northwest landfill boundary and southeast corner have remained elevated but stable.

3.2.2 Former Landfill Area

A total of 12 soil-gas monitoring well clusters are positioned around the Former Landfill Area **(Figure 11)**. During 2019, the well clusters were monitored once, in August. The only existing operating facility within the immediate vicinity of the Former Landfill Area is Building 670, located approximately 650 feet to the southeast. This building houses the Chemical Holes Sr-90 groundwater treatment system. This facility does not have a basement. Based upon the sampling event, there was

no methane or hydrogen sulfide detected. **Table 9** details the 2019 soil-gas monitoring results for the Former Landfill Area. **Appendix A** contains the field notes recorded during the sampling events.

3.2.2.1 Trends in Soil-Gas Data

The results of monitoring the Former Landfill Area continue to be consistent with the initial survey of the methane gas migration conducted in 1995, during which concentrations between 0% to 0.1% methane were recorded. Methane has not been detected since 2005. Although hydrogen sulfide gas was measured during this initial survey it has not been detected since 2010.

Presently, there is no measured pathway for methane gas migration, nor do the concentrations represent an explosive hazard, as shown by the non-detectable readings on the LEL meter. The age of the Former Landfill Area and the types of materials disposed of would likely result in low levels or the absence of methane or hydrogen sulfide.

4.0 MAINTENANCE AND REPAIR

Monthly site inspections were performed by BNL at the Current and Former Landfill areas to monitor the structural and/or operational status of the landfill cap, gas vents, drainage structure, fences and environmental monitoring system (groundwater wells, soil-gas wells) in accordance with the O&M Manuals. A copy of the inspection reports is included in **Appendix B**. Maintenance and repair work completed by BNL is discussed below.

4.1 Landfill Cap and Gas Vents

To prevent ruts in the landfills caused by the weight of the lawn mowers during periods of above normal precipitation, grass cutting is only conducted when optimal soil conditions are evident. During 2019, the grass at the Current and Former Landfills was cut during June and October. The vegetation along the Current Landfill asphalt road edges was partially sprayed with herbicide. Pine seedlings observed growing on the edge of the Former Landfill area were hand pulled at the time of inspection. The seedlings only penetrated the top soil cover. Several animal burrows at both the Current and Former Landfills were filled in throughout 2019. The burrows did not penetrate past the protection layer of the cap. During the June grass cutting event in the Former Landfill, a six inch passive gas vent riser and gooseneck was found damaged presumably by being hit by a mower. The six-inch schedule 80 PVC riser was found to be slightly dislodged from the pipe boot connection approximately 2 feet below grade. The licensed well installation contractor who performed the repair work reconnected the riser pipe and added a cement pad for stability.

4.2 Drainage Structures

The drainage structures at both the Current and Former Landfill areas were maintained. They were observed to be operational and structurally sound during the site inspections. Small pine seedlings and weeds were noted growing in the drainage channels of both landfills during various times of the year. The weeds died off as cold weather set in. If they grow back in sufficient numbers, they will either be cut back or sprayed with herbicide.

4.3 Environmental Monitoring System

The monitoring wells and soil-gas monitoring wells associated with the landfills required no significant maintenance. Access to the soil-gas monitoring wells was cleared via mechanical weed whacking prior to each sampling event.

4.4 Related Structures

No structures other than the passive gas vent riser and gooseneck described above required maintenance during 2019.

5.0 CONCLUSIONS AND RECOMMENDATIONS

5.1 Groundwater Monitoring

5.1.1 Conclusions for the Current Landfill

- Although low levels of contaminants continue to be detected, the landfill controls are effective at reducing the impact of the Current Landfill on groundwater quality as evidenced by the improving quality of groundwater downgradient of the landfill.

- Benzene was detected in downgradient well 087-11 and 088-110 at concentrations slightly above the groundwater standard with a maximum concentration of 2.44 µg/L and 1.01 µg/L respectively. The other VOCs detected above the groundwater standard were chloroethane and 1,1-dichloroethane. 1,1-Dichloroethane was detected above the standard of 5 µg/L in monitoring well 088-109. The maximum concentration of 1,1-dichloroethane was 5.32 µg/L. Chloroethane was detected in wells 088-22, 088-109 and 088-110 above the groundwater standard of 5 µg/L with concentrations up to 15.1 µg/L. Although VOCs continue to be detected in downgradient wells, an analysis of the trends of VOCs indicate the concentrations are stable to decreasing. These VOCs are naturally attenuating and are not detected at the site boundary above the drinking water standard.

- Concentrations of landfill water chemistry parameters and metals such as ammonia and iron in several downgradient wells were above the upgradient values. This suggests that leachate continues to emanate from the landfill into groundwater. Ammonia was the only water chemistry parameter detected above the standard of 2 mg/L, in downgradient well 087-11 at a maximum of 5.2 mg/L.

- During 2019, iron and chromium in the background well, and aluminum, iron, manganese, and sodium in several downgradient wells were detected above their respective groundwater standards. These parameters and concentrations are consistent with historic values.

- Strontium-90 was detected in well 088-21 downgradient of the Current Landfill, but at concentrations well below groundwater standards. This is consistent with historical observations. There have been no detections of radionuclides above the drinking water standards since 1998.

5.1.2 Recommendations for the Current Landfill

- The monitoring well network for the Current Landfill is adequate, and no changes to the network or the sampling frequency are recommended at this time.

5.1.3 Conclusions for the Former Landfill Area

- Monitoring at the Former Landfill continue to show only limited impact to groundwater quality, and that the controls are effective.
- All strontium-90 detections were below the groundwater standard of 8 pCi/L during 2019. The highest strontium-90 result was in well 106-44 at 3.18 pCi/L. The strontium-90 results are consistent with historic data.

5.1.4 Recommendations for the Former Landfill Area

- The monitoring well network and sampling schedule for the Former Landfill are adequate, and no changes are recommended at this time.

5.2 Soil-Gas Monitoring

5.2.1 Conclusions for the Current Landfill

- Methane and/or hydrogen sulfide levels in wells located along the west landfill boundary, north landfill boundary and southeast corner have remained stable and have not shown any significant increases or decreases over time. No gas migration has been observed this year at the outpost soil-gas wells along Brookhaven Avenue.

5.2.2 Recommendations for the Current Landfill

- The soil-gas monitoring program is adequate at this time and no changes are recommended.

5.2.3 Conclusions for the Former Landfill Area

- Methane and hydrogen sulfide monitoring at the Former Landfill Area continue to show no detectable levels of landfill gas. Methane has not been detected at or above standards since monitoring began in 1996.

5.2.4 Recommendations for the Former Landfill Area

- The soil-gas monitoring program is adequate at this time and no changes are recommended.

5.3 Maintenance and Repair

- Maintenance of the landfill caps will continue in accordance with the O&M requirements.

5.3.1 Current Landfill

- Monthly inspections and maintenance will continue in accordance with the O&M requirements. Access to the soil-gas monitoring wells will continue to be cleared via mechanical weed whacking. Continue the removal of small pines and weeds in the drainage channel during 2020.

5.3.2 Former Landfill Area

- Monthly inspections and maintenance will continue in accordance with the O&M requirements. Access to the soil-gas monitoring wells will continue to be cleared via mechanical weed whacking. Continue the removal of small pines and weeds in the drainage channel during 2020.

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Table 1

Analytical Requirements for Groundwater Samples

Well ID	Project 1	Project 2	Decision Subunit	EPA 524.2 VOCs	TSS/TDS	Sufates/Chloride/Alkalinity	TK Nitrogen	Total Nitrogen	Nitrates	Nitrites	Ammonia	TAL Metals	Cyanide	EPA 901 Gamma Spec	EPA 906 Tritium	EPA 905 Sr 90	Blind Duplicate/MS/MSD	Frequency (events/year)
087-09	CLF		Background	X[b]	X[b]	X[b]	X[b]	X[b]	X[b]	X[b]	X[b]	X[b]	X[b]					2
087-11	CLF		Downgradient	X[b]	X[b]	X[b]	X[b]	X[b]	X[b]	X[b]	X[b]	X[b]	X[b]					2
087-23	CLF		Downgradient	X[b]	X[b]	X[b]	X[b]	X[b]	X[b]	X[b]	X[b]	X[b]	X[b]	X[a]	X[a]	X[a]		2
087-24	CLF		Downgradient	X[a]	X[b]	X[b]	X[b]	X[b]	X[b]	X[b]	X[b]	X[b]	X[b]					2
087-26	CLF		Downgradient	X[b]	X[b]	X[b]	X[b]	X[b]	X[b]	X[b]	X[b]	X[b]	X[b]					2
087-27	CLF		Downgradient	X[b]	X[b]	X[b]	X[b]	X[b]	X[b]	X[b]	X[b]	X[b]	X[b]	X[a]	X[a]	X[a]		2
088-109	CLF		Downgradient	X	X[b]	X[b]	X[b]	X[b]	X[b]	X[b]	X[b]	X[b]	X[b]	X[a]	X[a]	X[a]	X	4
088-110	CLF		Downgradient	X[b]	X[b]	X[b]	X[b]	X[b]	X[b]	X[b]	X[b]	X[b]	X[b]					2
088-21	CLF		Downgradient	X[b]	X[b]	X[b]	X[b]	X[b]	X[b]	X[b]	X[b]	X[b]	X[b]	X[a]	X[a]	X[a]		2
088-22	CLF		Downgradient	X[a]	X[a]	X[a]	X[a]	X[a]	X[a]	X[a]	X[a]	X[a]	X[a]					1a
088-23	CLF		Downgradient	X[a]	X[a]	X[a]	X[a]	X[a]	X[a]	X[a]	X[a]	X[a]	X[a]					1a
098-99	CLF	OU I (South Boundary)	Downgradient	X														4
097-64	FLF		Downgradient													X[a]		1a
106-02	FLF		Downgradient													X[a]		1a
106-43	FLF		Downgradient													X[a]		1a
106-44	FLF		Downgradient													X[a]		1a
106-45	FLF		Downgradient													X[a]		1a

NOTES:
a: Collect in 4th Quarter only.
b: Collect in 2nd and 4th Quarters.

Table 2 Current Landfill - Summary of 2019 Volitile Organic Compounds.

		087-09		087-09		087-11		087-11		087-23		087-23		087-24		087-26	
	Groundwater Standards	6/12/2019		12/16/2019		6/13/2019		12/16/2019		6/13/2019		12/16/2019		12/16/2019		6/12/2019	
Analtye	(ug/L)	(ug/L)		(ug/L)		(ug/L)		(ug/L)		(ug/L)		(ug/L)		(ug/L)		(ug/L)	
1,1,1,2-Tetrachloroethane	5	1	U	0.5	U	1	U	0.5	U	1	U	0.5	U	0.5	U	1	U
1,1,1-Trichloroethane	5	1	U	0.5	U	1	U	0.5	U	1	U	0.5	U	0.5	U	1	U
1,1,2,2-Tetrachloroethane	5	1	U	0.5	U	1	U	0.5	U	1	U	0.5	U	0.5	U	1	U
1,1,2-Trichloroethane	1	1	U	0.5	U	1	U	0.5	U	1	U	0.5	U	0.5	U	1	U
1,1-Dichloroethane	5	1	U	0.5	U	1	U	0.5	U	1	U	0.2	J	0.5	U	1	U
1,1-Dichloroethylene	5	1	U	0.5	U	1	U	0.5	U	1	U	0.5	U	0.5	U	1	U
1,1-Dichloropropene	5	1	U	0.5	U	1	U	0.5	U	1	U	0.5	U	0.5	U	1	U
1,2,3-Trichlorobenzene	5	1	U	0.5	U	1	U	0.5	U	1	U	0.5	U	0.5	U	1	U
1,2,3-Trichloropropane	0.04	1	U	0.5	U	1	U	0.5	U	1	U	0.5	U	0.5	U	1	U
1,2,4-Trichlorobenzene	5	1	U	0.5	U	1	U	0.5	U	1	U	0.5	U	0.5	U	1	U
1,2-Dichloroethane	0.6	1	U	0.5	U	1	U	0.5	U	1	U	0.5	U	0.5	U	1	U
1,2-Dichloropropane	1	1	U	0.5	U	1	U	0.5	U	1	U	0.5	U	0.5	U	1	U
1,3-Dichloropropane	5	1	U	0.5	U	1	U	0.5	U	1	U	0.5	U	0.5	U	1	U
2,2-Dichloropropane	5	1	U	0.5	U	1	U	0.5	U	1	U	0.5	U	0.5	U	1	U
Benzene	1	1	U	0.5	U	**1.31**		**2.44**		0.67	J	0.64		0.5	U	1	U
Benzene, 1,2,4-trimethyl	5	1	U	0.5	U	1	U	0.47	J	1	U	0.84		0.5	U	1	U
Benzene, 1,3,5-trimethyl-	5	2	U	0.5	U	2	U	0.5	U	2	U	0.5	U	0.5	U	2	U
Benzene, 1-methylethyl-	--	1	U	0.5	U	1	U	0.58		1	U	0.5	U	0.5	U	1	U
Bromobenzene	5	1	U	0.5	U	1	U	0.5	U	1	U	0.5	U	0.5	U	1	U
Bromodichloromethane	50	1	U	0.5	U	1	U	0.5	U	1	U	0.5	U	0.5	U	1	U
Bromoform	50	1	U	0.5	U	1	U	0.5	U	1	U	0.5	U	0.5	U	1	U
Carbon tetrachloride	5	1	U	0.5	U	1	U	0.5	U	1	U	0.5	U	0.5	U	1	U
Chlorobenzene	5	1	U	0.5	U	0.51	J	0.79		0.45	J	0.51		0.5	U	1	U
Chlorobromomethane	5	1	U	0.5	U	1	U	0.5	U	1	U	0.5	U	0.5	U	1	U
Chloroethane	5	1	U	0.5	U	1.66		3.33		2.12		2.23		0.5	U	1	U
Chloroform	7	0.47	J	0.57	U	1	U	0.5	U	1	U	0.5	U	0.5	U	1	U
cis-1,2-Dichloroethylene	5	1	U	0.5	U	1	U	0.5	U	1	U	0.5	U	0.5	U	1	U
cis-1,3-Dichloropropene	0.4	1	U	0.5	U	1	U	0.5	U	1	U	0.5	U	0.5	U	1	U
Cymene	5	1	U	0.5	U	1	U	0.5	U	1	U	0.5	U	0.5	U	1	U
DBCP	0.04	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U
Dibromochloromethane	5	1	U	0.5	U	1	U	0.5	U	1	U	0.5	U	0.5	U	1	U
Dibromomethane	5	1	U	0.5	U	1	U	0.5	U	1	U	0.5	U	0.5	U	1	U
Dichlorodifluoromethane	5	1	U	0.5	U	1	U	0.5	U	1	U	0.5	U	0.5	U	1	U
EDB	0.05	1	U	0.5	U	1	U	0.5	U	1	U	0.5	U	0.5	U	1	U
Ethene, 1,2-dichloro-, (E)-	5	1	U	0.5	U	1	U	0.5	U	1	U	0.5	U	0.5	U	1	U
Ethylbenzene	5	1	U	0.5	U	1	U	0.8		1	U	0.5	U	0.5	U	1	U
Hexachlorobutadiene	0.5	1	U	0.5	U	1	U	0.5	U	1	U	0.5	U	0.5	U	1	U
m-Dichlorobenzene	3	1	U	0.5	U	1	U	0.5	U	1	U	0.5	U	0.5	U	1	U
m/p xylene	5	2	U	1	U	2	U	0.81	J	2	U	1	U	1	U	2	U
Methyl bromide	5	1	U	0.5	U	1	U	0.5	U	1	U	0.5	U	0.5	U	1	U
Methyl chloride	5	1	U	0.5	U	1	U	0.5	U	1	U	0.5	U	0.5	U	1	U
Methyl tert-butyl ether	10	1	U	0.5	U	1	U	0.19	J	1	U	0.5	U	0.5	U	1	U
Methylene chloride	5	5	U	0.5	U	5	U	0.5	U	5	U	0.5	U	0.5	U	5	U
n-Butylbenzene	5	1	U	0.5	U	1	U	0.5	U	1	U	0.5	U	0.5	U	1	U
n-Propylbenzene	5	1	U	0.5	U	1	U	0.38	J	1	U	0.5	U	0.5	U	1	U
Naphthalene	10	1	U	0.5	U	1	U	3.6		1	U	0.5	U	0.5	U	1	U
o-Chlorotoluene	5	1	U	0.5	U	1	U	0.5	U	1	U	0.5	U	0.5	U	1	U
o-Dichlorobenzene	3	1	U	0.5	U	1	U	0.29	J	1	U	0.5	U	0.5	U	1	U
o-Xylene	5	1	U	0.5	U	1	U	0.47	J	1	U	0.5	U	0.5	U	1	U
p-Chlorotoluene	5	1	U	0.5	U	1	U	0.5	U	1	U	0.5	U	0.5	U	1	U
p-Dichlorobenzene	3	1	U	0.5	U	1	U	0.39	J	1	U	0.38	J	0.5	U	1	U
sec-Butylbenzene	5	1	U	0.5	U	1	U	0.58		1	U	0.5	U	0.5	U	1	U
Styrene	5	1	U	0.5	U	1	U	0.5	U	1	U	0.5	U	0.5	U	1	U
tert-Butylbenzene	5	1	U	0.5	U	1	U	0.5	U	1	U	0.5	U	0.5	U	1	U
Tetrachloroethylene	5	1	U	0.5	U	1	U	0.5	U	1	U	0.5	U	0.5	U	1	U
Toluene	5	1	U	0.5	U	0.67	J	0.5	U	1	U	0.5	U	0.5	U	1	U
trans-1,3-Dichloropropene	0.4	1	U	0.5	U	1	U	0.5	U	1	U	0.5	U	0.5	U	1	U
Trichloroethylene	5	1	U	0.5	U	1	U	0.5	U	1	U	0.5	U	0.5	U	1	U
Trichlorofluoromethane	5	1	U	0.5	U	1	U	0.5	U	1	U	0.5	U	0.5	U	1	U
Vinyl acetate	--	5	U			5	U			5	U					5	U
Vinyl chloride	2	1	U	0.5	U	1	U	0.5	U	1	U	0.5	U	0.5	U	1	U
524.2 TVOC	--			0				15.12				4.8		0			
8260 TVOC	--	0.47				4.15				3.24						0	

U: Analyte was analyzed for, but not detected above the MDL.

J: Value is estimated

Bold: Value exceeds Standard/Guiadance Value

Table 2 Current Landfill - Summary of 2019 Volitile Organic Compounds.

Analtye	Groundwater Standards (ug/L)	087-26 12/16/2019 (ug/L)		087-27 6/12/2019 (ug/L)		087-27 12/16/2019 (ug/L)		088-109 3/25/2019 (ug/L)		088-109 6/13/2019 (ug/L)		088-109 9/5/2019 (ug/L)		088-109 12/16/2019 (ug/L)		088-110 6/13/2019 (ug/L)		088-110 12/16/2019 (ug/L)	
1,1,1,2-Tetrachloroethane	5	0.5	U	1	U	0.5	U	0.5	U	1	U	0.5	U	0.5	U	1	U	0.5	U
1,1,1-Trichloroethane	5	0.5	U	1	U	0.5	U	0.5	U	1	U	0.5	U	0.5	U	1	U	0.5	U
1,1,2,2-Tetrachloroethane	5	0.5	U	1	U	0.5	U	0.5	U	1	U	0.5	U	0.5	U	1	U	0.5	U
1,1,2-Trichloroethane	1	0.5	U	1	U	0.5	U	0.5	U	1	U	0.5	U	0.5	U	1	U	0.5	U
1,1-Dichloroethane	5	0.5	U	1	U	0.5	U	0.78		0.99	J	**5.32**		0.81		0.53	J	0.86	
1,1-Dichloroethylene	5	0.5	U	1	U	0.5	U	0.5	U	1	U	0.5	U	0.5	U	1	U	0.5	U
1,1-Dichloropropene	5	0.5	U	1	U	0.5	U	0.5	U	1	U	0.5	U	0.5	U	1	U	0.5	U
1,2,3-Trichlorobenzene	5	0.5	U	1	U	0.5	U	0.5	U	1	U	0.5	U	0.5	U	1	U	0.5	U
1,2,3-Trichloropropane	0.04	0.5	U	1	U	0.5	U	0.5	U	1	U	0.5	U	0.5	U	1	U	0.5	U
1,2,4-Trichlorobenzene	5	0.5	U	1	U	0.5	U	0.5	U	1	U	0.5	U	0.5	U	1	U	0.5	U
1,2-Dichloroethane	0.6	0.5	U	1	U	0.5	U	0.5	U	1	U	0.5	U	0.5	U	1	U	0.5	U
1,2-Dichloropropane	1	0.5	U	1	U	0.5	U	0.5	U	1	U	0.5	U	0.5	U	1	U	0.5	U
1,3-Dichloropropane	5	0.5	U	1	U	0.5	U	0.5	U	1	U	0.5	U	0.5	U	1	U	0.5	U
2,2-Dichloropropane	5	0.5	U	1	U	0.5	U	0.5	U	1	U	0.5	U	0.5	U	1	U	0.5	U
Benzene	1	0.5	U	1	U	0.76		0.5	U	1	U	0.53		0.5	U	0.58	J	**1.01**	
Benzene, 1,2,4-trimethyl	5	0.5	U	1	U	0.5	U	0.5	U	1	U	0.5	U	0.5	U	1	U	0.5	U
Benzene, 1,3,5-trimethyl-	5	0.5	U	2	U	0.5	U	0.5	U	2	U	0.5	U	0.5	U	2	U	0.5	U
Benzene, 1-methylethyl-	--	0.5	U	1	U	0.5	U	0.5	U	1	U	0.5	U	0.5	U	1	U	0.5	U
Bromobenzene	5	0.5	U	1	U	0.5	U	0.5	U	1	U	0.5	U	0.5	U	1	U	0.5	U
Bromodichloromethane	50	0.5	U	1	U	0.5	U	0.5	U	1	U	0.5	U	0.5	U	1	U	0.5	U
Bromoform	50	0.5	U	1	U	0.5	U	0.5	U	1	U	0.5	U	0.5	U	1	U	0.5	U
Carbon tetrachloride	5	0.5	U	1	U	0.5	U	0.5	U	1	U	0.5	U	0.5	U	1	U	0.5	U
Chlorobenzene	5	0.5	U	1	U	0.5		0.5	U	1	U	0.5	U	0.5	U	1	U	0.46	J
Chlorobromomethane	5	0.5	U	1	U	0.5	U	0.5	U	1	U	0.5	U	0.5	U	1	U	0.5	U
Chloroethane	5	0.5	U	1	U	0.5	U	2.37		4.38		**14.9**		0.5	U	**8.91**		**10.3**	
Chloroform	7	0.5	U	0.34	J	0.5	U	0.5	U	1	U	0.5	U	0.5	U	1	U	0.5	U
cis-1,2-Dichloroethylene	5	0.5	U	1	U	0.5	U	0.5	U	1	U	0.5	U	0.5	U	1	U	0.5	U
cis-1,3-Dichloropropene	0.4	0.5	U	1	U	0.5	U	0.5	U	1	U	0.5	U	0.5	U	1	U	0.5	U
Cymene	5	0.5	U	1	U	0.5	U	0.5	U	1	U	0.5	U	0.5	U	1	U	0.5	U
DBCP	0.04	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U
Dibromochloromethane	5	0.5	U	1	U	0.5	U	0.5	U	1	U	0.5	U	0.5	U	1	U	0.5	U
Dibromomethane	5	0.5	U	1	U	0.5	U	0.5	U	1	U	0.5	U	0.5	U	1	U	0.5	U
Dichlorodifluoromethane	5	0.5	U	1	U	0.5	U	0.5	U	1	U	0.5	U	0.5	U	1	U	0.5	U
EDB	0.05	0.5	U	1	U	0.5	U	0.5	U	1	U	0.5	U	0.5	U	1	U	0.5	U
Ethene, 1,2-dichloro-, (E)-	5	0.5	U	1	U	0.5	U	0.5	U	1	U	0.5	U	0.5	U	1	U	0.5	U
Ethylbenzene	5	0.5	U	1	U	0.5	U	0.5	U	1	U	0.5	U	0.5	U	1	U	0.5	U
Hexachlorobutadiene	0.5	0.5	U	1	U	0.5	U	0.5	U	1	U	0.5	U	0.5	U	1	U	0.5	U
m-Dichlorobenzene	3	0.5	U	1	U	0.5	U	0.5	U	1	U	0.5	U	0.5	U	1	U	0.5	U
m/p xylene	5	1	U	2	U	1	U	1	U	2	U	1	U	1	U	2	U	1	U
Methyl bromide	5	0.5	U	1	U	0.5	U	0.5	U	1	U	0.5	U	0.5	U	1	U	0.5	U
Methyl chloride	5	0.5	U	1	U	0.5	U	0.5	U	1	U	0.5	U	0.5	U	1	U	0.5	U
Methyl tert-butyl ether	10	0.5	U	1	U	0.5	U	0.5	U	1	U	0.5	U	0.5	U	1	U	0.5	U
Methylene chloride	5	0.5	U	5	U	0.5	U	0.5	U	5	U	0.5	U	0.5	U	5	U	0.5	U
n-Butylbenzene	5	0.5	U	1	U	0.5	U	0.5	U	1	U	0.5	U	0.5	U	1	U	0.5	U
n-Propylbenzene	5	0.5	U	1	U	0.5	U	0.5	U	1	U	0.5	U	0.5	U	1	U	0.5	U
Naphthalene	10	0.5	U	1	U	0.5	U	0.5	U	1	U	0.5	U	0.5	U	1	U	0.5	U
o-Chlorotoluene	5	0.5	U	1	U	0.5	U	0.5	U	1	U	0.5	U	0.5	U	1	U	0.5	U
o-Dichlorobenzene	3	0.5	U	1	U	0.5	U	0.5	U	1	U	0.5	U	0.5	U	1	U	0.5	U
o-Xylene	5	0.5	U	1	U	0.5	U	0.5	U	1	U	0.5	U	0.5	U	1	U	0.5	U
p-Chlorotoluene	5	0.5	U	1	U	0.5	U	0.5	U	1	U	0.5	U	0.5	U	1	U	0.5	U
p-Dichlorobenzene	3	0.5	U	1	U	0.2	J	0.5	U	1	U	0.5	U	0.5	U	1	U	0.42	J
sec-Butylbenzene	5	0.5	U	1	U	0.5	U	0.5	U	1	U	0.5	U	0.5	U	1	U	0.5	U
Styrene	5	0.5	U	1	U	0.5	U	0.5	U	1	U	0.5	U	0.5	U	1	U	0.5	U
tert-Butylbenzene	5	0.5	U	1	U	0.5	U	0.5	U	1	U	0.5	U	0.5	U	1	U	0.5	U
Tetrachloroethylene	5	0.5	U	1	U	0.5	U	0.5	U	1	U	0.5	U	0.5	U	1	U	0.5	U
Toluene	5	0.5	U	1	U	0.5	U	0.5	U	1	U	0.5	U	0.5	U	1	U	0.5	U
trans-1,3-Dichloropropene	0.4	0.5	U	1	U	0.5	U	0.5	U	1	U	0.5	U	0.5	U	1	U	0.5	U
Trichloroethylene	5	0.5	U	1	U	0.5	U	0.5	U	1	U	0.5	U	0.5	U	1	U	0.5	U
Trichlorofluoromethane	5	0.5	U	1	U	0.5	U	0.5	U	1	U	0.5	U	0.5	U	1	U	0.5	U
Vinyl acetate	--			5	U					5	U					5	U		
Vinyl chloride	2	0.5	U	1	U	0.5	U	0.5	U	1	U	0.5	U	0.5	U	1	U	0.5	U
524.2 TVOC	--	0				1.46		3.15				20.75		0.81				13.05	
8260 TVOC	--			0.34						5.37						10.02			

U: Analyte was analyzed for, but not detected above the MDL.

J: Value is estimated

Bold: Value exceeds Standard/Guiadance Value

Table 2 Current Landfill - Summary of 2019 Volitile Organic Compounds.

		088-21		088-21		088-22		088-23		098-99		098-99		098-99		098-99	
	Groundwater Standards	6/14/2019		12/16/2019		12/16/2019		12/16/2019		3/25/2019		6/14/2019		9/5/2019		12/16/2019	
Analtye	(ug/L)	(ug/L)		(ug/L)		(ug/L)		(ug/L)		(ug/L)		(ug/L)		(ug/L)		(ug/L)	
1,1,1,2-Tetrachloroethane	5	1	U	0.5	U	0.5	U	0.5	U	0.5	U	1	U	0.5	U	0.5	U
1,1,1-Trichloroethane	5	1	U	0.5	U	0.5	U	0.5	U	0.5	U	1	U	0.5	U	0.5	U
1,1,2,2-Tetrachloroethane	5	1	U	0.5	U	0.5	U	0.5	U	0.5	U	1	U	0.5	U	0.5	U
1,1,2-Trichloroethane	1	1	U	0.5	U	0.5	U	0.5	U	0.5	U	1	U	0.5	U	0.5	U
1,1-Dichloroethane	5	1	U	0.5	U	4.38		0.5	U	1.94		0.92	J	3.21		3	
1,1-Dichloroethylene	5	1	U	0.5	U	0.5	U	0.5	U	0.5	U	1	U	0.5	U	0.5	U
1,1-Dichloropropene	5	1	U	0.5	U	0.5	U	0.5	U	0.5	U	1	U	0.5	U	0.5	U
1,2,3-Trichlorobenzene	5	1	U	0.5	U	0.5	U	0.5	U	0.5	U	1	U	0.5	U	0.5	U
1,2,3-Trichloropropane	0.04	1	U	0.5	U	0.5	U	0.5	U	0.5	U	1	U	0.5	U	0.5	U
1,2,4-Trichlorobenzene	5	1	U	0.5	U	0.5	U	0.5	U	0.5	U	1	U	0.5	U	0.5	U
1,2-Dichloroethane	0.6	1	U	0.5	U	0.5	U	0.5	U	0.5	U	1	U	0.5	U	0.5	U
1,2-Dichloropropane	1	1	U	0.5	U	0.5	U	0.5	U	0.5	U	1	U	0.5	U	0.5	U
1,3-Dichloropropane	5	1	U	0.5	U	0.5	U	0.5	U	0.5	U	1	U	0.5	U	0.5	U
2,2-Dichloropropane	5	1	U	0.5	U	0.5	U	0.5	U	0.5	U	1	U	0.5	U	0.5	U
Benzene	1	1	U	0.5	U	0.49	J	0.5	U	0.5	U	1	U	0.26	J	0.5	U
Benzene, 1,2,4-trimethyl	5	1	U	0.5	U	0.5	U	0.5	U	0.5	U	1	U	0.5	U	0.5	U
Benzene, 1,3,5-trimethyl-	5	2	U	0.5	U	0.5	U	0.5	U	0.5	U	2	U	0.5	U	0.5	U
Benzene, 1-methylethyl-	--	1	U	0.5	U	0.5	U	0.5	U	0.5	U	1	U	0.5	U	0.5	U
Bromobenzene	5	1	U	0.5	U	0.5	U	0.5	U	0.5	U	1	U	0.5	U	0.5	U
Bromodichloromethane	50	1	U	0.5	U	0.5	U	0.5	U	0.5	U	1	U	0.5	U	0.5	U
Bromoform	50	1	U	0.5	U	0.5	U	0.5	U	0.5	U	1	U	0.5	U	0.5	U
Carbon tetrachloride	5	1	U	0.5	U	0.5	U	0.5	U	0.5	U	1	U	0.5	U	0.5	U
Chlorobenzene	5	1	U	0.5	U	0.5	U	0.5	U	0.5	U	1	U	0.5	U	0.5	U
Chlorobromomethane	5	1	U	0.5	U	0.5	U	0.5	U	0.5	U	1	U	0.5	U	0.5	U
Chloroethane	5	1	U	0.5	U	**15.1**		0.5	U	0.5	U	1	U	0.5	U	0.5	U
Chloroform	7	1	U	0.5	U	0.5	U	0.5	U	0.5	U	1	U	0.5	U	0.5	U
cis-1,2-Dichloroethylene	5	1	U	0.5	U	0.5	U	0.5	U	0.25	J	1	U	0.27	J	0.5	U
cis-1,3-Dichloropropene	0.4	1	U	0.5	U	0.5	U	0.5	U	0.5	U	1	U	0.5	U	0.5	U
Cymene	5	1	U	0.5	U	0.5	U	0.5	U	0.5	U	1	U	0.5	U	0.5	U
DBCP	0.04	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U
Dibromochloromethane	5	1	U	0.5	U	0.5	U	0.5	U	0.5	U	1	U	0.5	U	0.5	U
Dibromomethane	5	1	U	0.5	U	0.5	U	0.5	U	0.5	U	1	U	0.5	U	0.5	U
Dichlorodifluoromethane	5	1	U	0.5	U	0.5	U	0.5	U	0.5	U	1	U	0.5	U	0.5	U
EDB	0.05	1	U	0.5	U	0.5	U	0.5	U	0.5	U	1	U	0.5	U	0.5	U
Ethene, 1,2-dichloro-, (E)-	5	1	U	0.5	U	0.5	U	0.5	U	0.5	U	1	U	0.5	U	0.5	U
Ethylbenzene	5	1	U	0.5	U	0.5	U	0.5	U	0.5	U	1	U	0.5	U	0.5	U
Hexachlorobutadiene	0.5	1	U	0.5	U	0.5	U	0.5	U	0.5	U	1	U	0.5	U	0.5	U
m-Dichlorobenzene	3	1	U	0.5	U	0.5	U	0.5	U	0.5	U	1	U	0.5	U	0.5	U
m/p xylene	5	2	U	1	U	1	U	1	U	1	U	2	U	1	U	1	U
Methyl bromide	5	1	U	0.5	U	0.5	U	0.5	U	0.5	U	1	U	0.5	U	0.5	U
Methyl chloride	5	1	U	0.5	U	0.5	U	0.5	U	0.5	U	1	U	0.5	U	0.5	U
Methyl tert-butyl ether	10	1	U	0.5	U	0.5	U	0.5	U	0.5	U	1	U	0.5	U	0.5	U
Methylene chloride	5	5	U	0.5	U	0.5	U	0.5	U	0.5	U	5	U	0.5	U	0.5	U
n-Butylbenzene	5	1	U	0.5	U	0.5	U	0.5	U	0.5	U	1	U	0.5	U	0.5	U
n-Propylbenzene	5	1	U	0.5	U	0.5	U	0.5	U	0.5	U	1	U	0.5	U	0.5	U
Naphthalene	10	1	U	0.5	U	0.5	U	0.5	U	0.5	U	1	U	0.5	U	0.5	U
o-Chlorotoluene	5	1	U	0.5	U	0.5	U	0.5	U	0.5	U	1	U	0.5	U	0.5	U
o-Dichlorobenzene	3	1	U	0.5	U	0.5	U	0.5	U	0.5	U	1	U	0.5	U	0.5	U
o-Xylene	5	1	U	0.5	U	0.5	U	0.5	U	0.5	U	1	U	0.5	U	0.5	U
p-Chlorotoluene	5	1	U	0.5	U	0.5	U	0.5	U	0.5	U	1	U	0.5	U	0.5	U
p-Dichlorobenzene	3	1	U	0.5	U	0.5	U	0.5	U	0.5	U	1	U	0.5	U	0.5	U
sec-Butylbenzene	5	1	U	0.5	U	0.5	U	0.5	U	0.5	U	1	U	0.5	U	0.5	U
Styrene	5	1	U	0.5	U	0.5	U	0.5	U	0.5	U	1	U	0.5	U	0.5	U
tert-Butylbenzene	5	1	U	0.5	U	0.5	U	0.5	U	0.5	U	1	U	0.5	U	0.5	U
Tetrachloroethylene	5	1	U	0.5	U	0.5	U	0.5	U	0.5	U	1	U	0.5	U	0.5	U
Toluene	5	1	U	0.5	U	0.5	U	0.5	U	0.5	U	1	U	0.5	U	0.5	U
trans-1,3-Dichloropropene	0.4	1	U	0.5	U	0.5	U	0.5	U	0.5	U	1	U	0.5	U	0.5	U
Trichloroethylene	5	1	U	0.5	U	0.5	U	0.5	U	0.5	U	1	U	0.5	U	0.5	U
Trichlorofluoromethane	5	1	U	0.5	U	0.5	U	0.5	U	0.5	U	1	U	0.5	U	0.5	U
Vinyl acetate	--	5	U									5	U				
Vinyl chloride	2	1	U	0.5	U	0.5	U	0.5	U	0.5	U	1	U	0.5	U	0.5	U
524.2 TVOC	--			0		19.97		0		2.19				3.74		3	
8260 TVOC	--	0										0.92					

U: Analyte was analyzed for, but not detected above the MDL.

J: Value is estimated

Bold: Value exceeds Standard/Guiadance Value

Table 3

Current Landfill-Summary of 2019 Water Chemistry Data

Analtye	Groundwater Standards (mg/L)	087-09 6/12/2019 (mg/L)		087-09 12/16/2019 (mg/L)		087-11 6/13/2019 (mg/L)		087-11 12/16/2019 (mg/L)		087-23 6/13/2019 (mg/L)		087-23 12/16/2019 (mg/L)		087-24 6/13/2019 (mg/L)	
Alkalinity (as CaCO3)	--	36.6		25.5		155		168		89.4		91.7		26.8	
Ammonia (as N)	2	0.0437	J	0.0681	U	**5.2**		**4.33**		0.366		1.04		0.057	
Chloride	250	NS		22		NS		36.1		NS		16.7		NS	
Cyanide	0.2	0.00167	U	0.00167	U	0.00167	U	0.00167	U	0.00167	U	0.00167	U	0.00167	U
Nitrate (as N)	10	0.138	H	0.643		0.033	HU	0.033	U	0.341	H	0.033	U	0.589	H
Nitrite (as N)	1	0.033	HU	0.033	U	0.033	HU	0.033	U	0.033	HU	0.033	U	0.033	HU
Nitrite + Nitrate-N	10	0.0721		0.555		0.085	U	0.0306	J	0.0247	J	0.0433	J	0.617	
Nitrogen	--	1.09		0.768	U	6.7		4.71		0.745		1.3	U	0.657	
Sulfate	250	9.75		15.4		4.98		5.12		13.5		9.93		16.2	
TDS	--	150		94.3		213		296		75.7		164		177	
Total Kjeldahl Nitrogen	--	1.02		0.213	U	6.7		4.68		0.72		1.26	U	0.0395	J
TSS	--	4.2		7.6	J	49		11.6		4.4	J	10.4		0.722	J

U: Analyte was analyzed for, but not detected above MDL.

J: Value is estimated.

H: Analytical holding time exceeded.

Bold: Concentration exceeds Standard/Guidance Value

NS: No sample data.

Table 3

Current Landfill-Summary of 2019 Water Chemistry Data

Analtye	Groundwater Standards (mg/L)	087-24 12/16/2019 (mg/L)		087-26 6/12/2019 (mg/L)		087-26 12/16/2019 (mg/L)		087-27 6/12/2019 (mg/L)		087-27 12/16/2019 (mg/L)		088-109 6/13/2019 (mg/L)		088-109 12/16/2019 (mg/L)	
Alkalinity (as CaCO3)	--	27.5		22.9		28.3		65.2		68.1		106		61.1	
Ammonia (as N)	2	0.0927	U	0.0178	J	0.017	U	0.0897		0.756		0.887		0.21	U
Chloride	250	47.8		NS		38.6		NS		46.3		NS		8.47	
Cyanide	0.2	0.00167	U	0.00167	U	0.00167	U	0.00167	U	0.00167	U	0.00167	U	0.00167	U
Nitrate (as N)	10	0.471		0.476	H	0.528		0.0743	HJ	0.0689	J	0.033	HU	0.033	U
Nitrite (as N)	1	0.033	U	0.033	HU	0.033	U	0.033	HU	0.033	U	0.033	HU	0.033	U
Nitrite + Nitrate-N	10	0.489		0.472		0.548		0.017	U	0.0568		0.085	U	0.0377	J
Nitrogen	--	0.543	U	0.903		0.64	U	1.09		1.16	U	1.38		0.443	U
Sulfate	250	11.1		12.5		12		5.7		11.3		8.04		21.4	
TDS	--	120		82.9		109		141		226		191		114	
Total Kjeldahl Nitrogen	--	0.0538	U	0.431		0.0918	U	1.08		1.1	U	1.38		0.405	U
TSS	--	0.9	J	0.7	J	4		4	J	11.6		45		7.04	J

U: Analyte was analyzed for, but not detected above MDL.

J: Value is estimated.

H: Analytical holding time exceeded.

Bold: Concentration exceeds Standard/Guidance Value

NS: No sample data.

Table 3

Current Landfill-Summary of 2019 Water Chemistry Data

Analtye	Groundwater Standards (mg/L)	088-110 6/13/2019 (mg/L)		088-110 12/16/2019 (mg/L)		088-21 6/14/2019 (mg/L)		088-21 12/16/2019 (mg/L)		088-22 12/16/2019 (mg/L)		088-23 12/16/2019 (mg/L)	
Alkalinity (as CaCO3)	--	93		118		31.2		42.4		93.9		23.9	
Ammonia (as N)	2	0.248		0.57		0.0755		0.282		0.017	U	0.0683	U
Chloride	250	NS		25.1		NS		60.4		17.4		16.1	
Cyanide	0.2	0.00167	U	0.00167	U	0.00167	U	0.00167	U	0.00167	U	0.00167	U
Nitrate (as N)	10	0.033	HU	0.033	U	0.0735	J	0.49		0.033	U	0.395	
Nitrite (as N)	1	0.033	HU	0.033	U	0.033	U	0.033	U	0.033	U	0.033	U
Nitrite + Nitrate-N	10	0.017	U	0.0443	J	0.017	U	0.226		0.0177	J	0.387	
Nitrogen	--	0.228		0.622	U	0.162		1.34	U	0.114	U	0.429	U
Sulfate	250	14.7		14.3		1.75		3.77		9.91		15.5	
TDS	--	106		204		224		151		136		62.9	
Total Kjeldahl Nitrogen	--	0.228		0.578	U	0.153		1.11	U	0.0959	U	0.0423	U
TSS	--	16	J	4.4	J	5.1		27.2		0.6	J	1	J

U: Analyte was analyzed for, but not detected above MDL.

J: Value is estimated.

H: Analytical holding time exceeded.

Bold: Concentration exceeds Standard/Guidance Value

NS: No sample data.

Table 4

Current Landfill-Summary of 2019 Metals Data

Analtye	Groundwater Standards (ug/L)	087-09 6/12/2019 (ug/L)		087-09 12/16/2019 (ug/L)		087-11 6/13/2019 (ug/L)		087-11 12/16/2019 (ug/L)		087-23 6/13/2019 (ug/L)		087-23 12/16/2019 (ug/L)		087-24 6/13/2019 (ug/L)		087-24 12/16/2019 (ug/L)	
Aluminum	200	68	U	68	U	68	U	113	B	68	U	68	U	68	U	68	U
Antimony	3	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U
Arsenic	10	2	U	2.93	B	7.73		9.74	U	5.38		14.3	U	2	U	2	U
Barium	1000	17.4	B	16.4	B	42.8	B	48.7	B	61.4	B	51.5	B	15.4	B	19.9	B
Beryllium	3	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U
Cadmium	5	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U
Calcium	--	6800		7180		16300		21700		7820		10500		6640		9530	
Chromium	50	**79.8**		**65.8**	E	1	U	1	UE	1	U	1	UE	1	U	1.88	BE
Cobalt	--	1	U	1.55	B	3.99	B	4.48	B	12.9	B	19.2	B	1	U	1.43	B
Copper	200	2.95	N	2.13		1.32	BN	6.52		1.09	BN	1.47	B	0.566	BN	0.472	B
Iron	300	**1540**		**2680**		**74800**		**88000**		**36300**		**63100**		30	U	30	U
Lead	25	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
Magnesium	35000	3490	E	3430		5620	E	8570		3440	E	4240		4800	E	6850	
Manganese	300	93.1		134	N	**1940**		**4370**	N	**2430**		**4290**	N	1	U	1	UN
Mercury	0.7	0.067	U	0.067	U	0.067	U	0.067	U	0.067	U	0.067	U	0.067	U	0.067	U
Nickel	100	4.67	B	28.1	B	3.65	B	3.03	B	4.03	B	2.37	B	1.5	U	1.5	U
Potassium	--	873	B	937	B	4220	B	4990	B	913	B	1540	B	1510	B	1750	B
Selenium	10	2	U	2	U	2	U	2	U	2	U	2	U	2	U	2	U
Silver	50	0.3	U	0.3	U	0.3	U	0.3	U	0.3	U	0.3	U	0.3	U	0.3	U
Sodium	20000	18700		19600		**40500**		**31400**		6500		9420		**30800**		**26700**	
Thallium	2500	0.6	U	0.6	U	0.6	U	0.6	U	0.6	U	0.6	U	0.6	U	0.6	U
Vanadium	--	1.17	B	2	B	1	U	1.91	B	1	U	1.08	B	1	U	1.01	B
Zinc	2000	7.56	B	4.72	B	14.5	B	3.3	U	11.9	B	3.3	U	5.95	B	3.3	U

Table 4

Current Landfill-Summary of 2019 Metals Data

Analtye	Groundwater Standards (ug/L)	087-26 6/12/2019 (ug/L)		087-26 12/16/2019 (ug/L)		087-27 6/12/2019 (ug/L)		087-27 12/16/2019 (ug/L)		088-109 6/13/2019 (ug/L)		088-109 12/16/2019 (ug/L)		088-110 6/13/2019 (ug/L)		088-110 12/16/2019 (ug/L)	
Aluminum	200	68	U	68	U	68	U	68	U	68	U	68	U	68	U	68	U
Antimony	3	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U
Arsenic	10	2	U	2.3	B	2	U	4.52	B	6.42		5.79		4.9	B	12.3	U
Barium	1000	18.8	B	37.9	B	6.99	B	37.2	B	23	B	20.1	B	29.6	B	40.5	B
Beryllium	3	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U
Cadmium	5	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U
Calcium	--	4220	B	8710		13400		11900		20400		18500		14100		19400	
Chromium	50	1	U	1	UE	1	U	1	UE	1	U	1	UE	1	U	1	UE
Cobalt	--	1	U	1.29	B	1	U	6.73	B	4.18	B	4.95	B	2.02	B	5.31	B
Copper	200	3.66	N	2.38		0.599	BN	0.882	B	0.448	BN	0.3	U	0.818	BN	0.412	B
Iron	300	120		212		**2620**		**31000**		**50500**		**14100**		**37200**		**56600**	
Lead	25	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
Magnesium	35000	3230	E	6930		8260	E	3970		6450	E	7370		5170	E	6820	
Manganese	300	2.85	B	1.84	BN	**1140**		**5080**	N	**2180**		**1170**	N	**3100**		**3830**	N
Mercury	0.7	0.067	U	0.067	U	0.067	U	0.067	U	0.067	U	0.067	U	0.067	U	0.067	U
Nickel	100	1.5	U	1.5	U	1.5	U	21.2	B	2.7	B	1.5	U	2.46	B	1.5	U
Potassium	--	1320	B	1860	B	1020	B	2640	B	2250	B	1350	B	1960	B	2880	B
Selenium	10	2	U	2	U	2	U	2	U	2	U	2	U	2	U	2	U
Silver	50	0.3	U	0.3	U	0.3	U	0.3	U	0.3	U	0.3	U	0.3	U	0.3	U
Sodium	20000	16200		**22900**		4470	B	**27100**		5400		8110		16300		**21100**	
Thallium	2500	0.6	U	0.6	U	0.6	U	0.6	U	0.6	U	0.6	U	0.6	U	0.6	U
Vanadium	--	1	U	1.35	B	1	U	1	U	1	U	1	U	1	U	1.15	B
Zinc	2000	5.65	B	3.86	B	4.71	B	3.3	U	11.1	B	3.3	U	8.55	B	3.3	U

Table 4

Current Landfill-Summary of 2019 Metals Data

Analtye	Groundwater Standards (ug/L)	088-21 6/14/2019 (ug/L)		088-21 12/16/2019 (ug/L)		088-22 12/16/2019 (ug/L)		088-23 12/16/2019 (ug/L)	
Aluminum	200	68	U	**263**		68	U	68	U
Antimony	3	1	U	1	U	1	U	1	U
Arsenic	10	2	U	3.65	B	2.16	B	2.24	B
Barium	1000	6.6	B	11.8	B	80.4	B	3.31	B
Beryllium	3	1	U	1	U	1	U	1	U
Cadmium	5	1	U	1	U	1	U	1	U
Calcium	--	10200		7550		17400		8770	
Chromium	50	1	U	1	UE	1	UE	1	UE
Cobalt	--	1	U	1.57	B	1	U	1	U
Copper	200	0.887	BN	1.1	B	0.691	B	0.3	U
Iron	300	**2410**		**8820**		161		261	
Lead	25	0.5	U	0.5	U	0.5	U	0.5	U
Magnesium	35000	5630	E	4010		14300		3550	
Manganese	300	107		263	N	24	N	54.4	N
Mercury	0.7	0.067	U	0.067	U	0.067	U	0.067	U
Nickel	100	1.5	U	1.5	U	1.5	U	1.5	U
Potassium	--	671	B	1280	B	2570	B	692	B
Selenium	10	2	U	2	U	2	U	2	U
Silver	50	0.3	U	0.3	U	0.3	U	0.3	U
Sodium	20000	**47600**		**43900**		13700		12200	
Thallium	2500	0.6	U	0.6	U	0.6	U	0.6	U
Vanadium	--	2.35	B	11.4	B	1.04	B	1	U
Zinc	2000	4.93	B	3.3	U	3.3	U	3.3	U

U: Analyte was analyzed for, but not detected above MDL.

J: Value is estimated

Bold: Concentration exceeds Standard/Guidance Value.

B: Indicates that the value was less then the Required Detection Limit (CRDL), but greater than or equal to the Instrument Detection Limit(IDL).

E: %Difference of sample and SD is greater then 10%

N:The Matrix spike sample recovery is not within control limits.

Table 5

Current Landfill-Summary of 2019 Radionuclide Data

Analtye	**Groundwater Standards** pCi/L	**087-23 12/16/2019 pCi/L**				**087-27 12/16/2019 pCi/L**				**088-109 12/16/2019 pCi/L**				**088-21 12/16/2019 pCi/L**			
		Result	Qual	MDA	Error	Result	Qual	MDA	Error	Result	Qual	MDA	Error	Result	Qual	MDA	Error
Americium-241	1.2	-0.663	U	7.64	4.54	-1.01	U	10	6.24	2.82	U	8.08	4.88	-7.68	U	17.1	10.2
Beryllium-7	40000	-1.09	U	12	6.7	-4.87	U	13.3	12.4	3.22	U	12.6	6.85	-10.2	U	16.5	10.1
Cesium-134	80	0.171	U	1.69	0.944	-0.0876	U	1.8	0.988	-0.2	U	1.6	0.925	-0.555	U	2.16	1.23
Cesium-137	120	-0.565	U	1.97	1.78	1.17	U	1.75	0.934	-0.12	U	1.42	0.905	0.449	U	2.18	1.32
Co-60	200	-0.112	U	1.71	0.938	0.838	U	1.82	0.932	-0.26	U	1.59	1.01	-0.27	U	2.12	1.23
Cobalt-57	4000	-0.427	U	1.28	0.944	-0.746	U	1.41	0.86	0.326	U	1.45	0.842	-0.839	U	1.99	1.23
Europium-152	841	-0.567	U	4.51	2.75	2.05	U	5.23	2.86	-0.325	U	4.63	2.57	-1.63	U	6.74	4.65
Europium-154	573	-1.24	U	4.12	2.33	0.149	U	4.69	2.94	-1.23	U	4.31	2.79	2.15	U	7.04	4.13
Europium-155	4000	2.47	U	5.54	3.06	2.99	U	6.23	3.56	1.69	U	6.02	3.47	4.22	U	8.83	5.17
Manganese-54	2000	0.29	U	1.49	0.823	0.136	U	1.63	0.885	0.644	U	1.63	0.893	-0.812	U	2.17	1.26
Sodium-22	400	-0.418	U	1.45	0.82	0.0236	U	1.64	1.03	-0.398	U	1.52	0.98	0.575	U	2.47	1.47
Strontium-90	8	0.433	U	0.763	0.458	0.371	U	0.799	0.47	0.0392	U	0.786	0.42	1.33		0.694	0.522
Tritium	20000	-127	U	496	268	121	U	488	281	-77.3	U	482	264	21.5	U	484	272
Zinc-65	360	2.87	U	3.22	1.6	0.507	U	3.42	2.1	0.207	U	3.09	1.99	0.849	U	4.38	2.73

U: Analyte was analyzed for but not detected above the MDA.

Table 6

Former Landfill- Summary of 2019 Strontium-90 Data

Analtye	**Groundwater Standards** pCi/L	**097-64 12/13/2019 pCi/L**				**106-02 12/13/2019 pCi/L**				**106-43 12/13/2019 pCi/L**				**106-44 12/13/2019 pCi/L**				**106-45 12/13/2019 pCi/L**			
		Result	Qual	MDA	Error	Result	Qual	MDA	Error	Result	Qual	MDA	Error	Result	Qual	MDA	Error	Result	Qual	MDA	Error
Strontium-90	8	0.421	U	0.741	0.445	-0.403	U	0.796	0.352	0.62	U	0.757	0.476	3.18		0.752	0.725	0.582	U	0.766	0.484

U: Analyte was analyized for but not detected above the MDA.

Table 7
Current Landfill Soil Gas Monitoring Well Description

Current Landfill			
Soil Gas Monitoring Well	**Screen Location**	**Top of Screen (Feet BLS)**	**Bottom Screen (Feet BLS)**
SGMW-1 PROBE A	**Shallow**	**2.5**	**7.5**
SGMW-1 PROBE B	**Intermediate**	**10.5**	**17.5**
SGMW-1 PROBE C	**Deep**	**20**	**29.5**
SGMW-2 PROBE A	**Shallow**	**2.5**	**7.5**
SGMW-2 PROBE B	**Intermediate**	**10.5**	**16**
SGMW-2 PROBE C	**Deep**	**19**	**28**
SGMW-3 PROBE A	**Shallow**	**2.5**	**7.5**
SGMW-3 PROBE B	**Intermediate**	**10.5**	**17**
SGMW-3 PROBE C	**Deep**	**20**	**29**
SGMW-4 PROBE A	**Shallow**	**2.5**	**7.5**
SGMW-4 PROBE B	**Intermediate**	**10.5**	**20**
SGMW-4 PROBE C	**Deep**	**23**	**32**
SGMW-5 PROBE A	**Shallow**	**2.5**	**7.5**
SGMW-5 PROBE B	**Intermediate**	**10.5**	**22**
SGMW-5 PROBE C	**Deep**	**25**	**34**
SGMW-6 PROBE A	**Shallow**	**2.5**	**7.5**
SGMW-6 PROBE B	**Intermediate**	**10.5**	**18.5**
SGMW-6 PROBE C	**Deep**	**21.5**	**30.5**
SGMW-7 PROBE A	**Shallow**	**2.5**	**7.5**
SGMW-7 PROBE B	**Intermediate**	**10.5**	**16**
SGMW-7 PROBE C	**Deep**	**19**	**26**
SGMW-8 PROBE A	**Shallow**	**2.5**	**7.5**
SGMW-8 PROBE B	**Intermediate**	**10.5**	**16.5**
SGMW-8 PROBE C	**Deep**	**19.5**	**28.5**
SGMW-9 PROBE A	**Shallow**	**2.5**	**7.5**
SGMW-9 PROBE B	**Intermediate**	**10.5**	**20.5**
SGMW-9 PROBE C	**Deep**	**23.5**	**32.5**
SGMW-10 PROBE A	**Shallow**	**2.5**	**7.5**
SGMW-10 PROBE B	**Intermediate**	**10.5**	**15.5**
SGMW-10 PROBE C	**Deep**	**18.5**	**27.5**
SGMW-11 PROBE A	**Shallow**	**2.5**	**7.5**
SGMW-11 PROBE B	**Intermediate**	**10.5**	**16**
SGMW-12 PROBE A	**Shallow**	**2.5**	**7.5**
SGMW-12 PROBE B	**Intermediate**	**10.5**	**15**
SGMW-13 PROBE A	**Shallow**	**2.5**	**7.5**
SGMW-13 PROBE B	**Intermediate**	**10.5**	**13**
SGMW-14 PROBE A	**Shallow**	**2.5**	**7.5**
SGMW-14 PROBE B	**Intermediate**	**10.5**	**13**
SGMW-15 PROBE A	**Shallow**	**2.5**	**5.5**
SGMW-15 PROBE B	**Intermediate**	**8.5**	**11.5**
SGMW-16 PROBE A	**Shallow**	**2.5**	**5.5**
SGMW-16 PROBE B	**Intermediate**	**8.5**	**11**
SGMW-17 PROBE A	**Shallow**	**2.5**	**5.5**

Table 7
Current Landfill Soil Gas Monitoring Well Description

Current Landfill			
Soil Gas Monitoring Well	**Screen Location**	**Top of Screen (Feet BLS)**	**Bottom Screen (Feet BLS)**
SGMW-17 PROBE B	**Intermediate**	**8.5**	**11**
SGMW-18 PROBE A	**Shallow**	**2.5**	**7.5**
SGMW-18 PROBE B	**Intermediate**	**10.5**	**13.5**
SGMW-19 PROBE A	**Shallow**	**2.5**	**7.5**
SGMW-19 PROBE B	**Intermediate**	**10.5**	**17**

BLS – Below Land Surface

Current Landfill Outpost Wells		
Site ID	**Depth to Bottom from top PVC (feet)**	**PVC Stick Up from Ground (feet)**
GSGM-1A	**12.00**	**2.50**
GSGM-1B	**21.00**	**2.50**
GSGM-1C	**29.40**	**2.50**
GSGM-2A	**14.25**	**2.50**
GSGM-2B	**20.05**	**2.50**
GSGM-2C	**27.00**	**2.50**
GSGM-3A	**13.91**	**2.50**
GSGM-3B	**17.75**	**2.50**
GSGM-4A	**11.50**	**2.50**
GSGM-4B	**15.20**	**2.50**

Table 7
Former Landfill Soil Gas Monitoring Well Description

Former Landfill			
Soil Gas Monitoring Well	**Screen Location**	**Top of Screen (Feet BLS)**	**Bottom Screen (Feet BLS)**
SGMW-1 PROBE A	**Shallow**	**2.5**	**10**
SGMW-1 PROBE B	**Intermediate**	**15**	**43**
SGMW-2PROBE A	**Shallow**	**2.5**	**10**
SGMW-2 PROBE B	**Intermediate**	**15**	**40**
SGMW-3 PROBE A	**Shallow**	**2**	**9.5**
SGMW-3 PROBE B	**Intermediate**	**14.5**	**36**
SGMW-4 PROBE A	**Shallow**	**2.5**	**10**
SGMW-4 PROBE B	**Intermediate**	**15**	**35.5**
SGMW-5 PROBE A	**Shallow**	**2.5**	**10**
SGMW-5 PROBE B	**Intermediate**	**15**	**37**
SGMW-6 PROBE A	**Shallow**	**2.7**	**10.2**
SGMW-6 PROBE B	**Intermediate**	**22**	**37.2**
SGMW-7 PROBE A	**Shallow**	**2.8**	**10.3**
SGMW-7 PROBE B	**Intermediate**	**15**	**42**
SGMW-8 PROBE A	**Shallow**	**2.5**	**10**
SGMW-8 PROBE B	**Intermediate**	**15**	**47**
SGMW-9 PROBE A	**Shallow**	**2.5**	**10**
SGMW-9 PROBE B	**Intermediate**	**15**	**52**
SGMW-10 PROBE A	**Shallow**	**2.5**	**10**
SGMW-10 PROBE B	**Intermediate**	**15**	**52**
SGMW-11 PROBE A	**Shallow**	**2.5**	**10**
SGMW-11 PROBE B	**Intermediate**	**15**	**46**
SGMW-12 PROBE A	**Shallow**	**2.5**	**10**
SGMW-12 PROBE B	**Intermediate**	**15**	**43.5**

BLS – Below Land Surface

Table 8

2019 Current Landfill Soil Gas Monitoring Summary Table

Soil/Gas Monitoring Well	Methane (% By Volume) 4/5/2019	Methane (% By Volume) 6/13/2019	Methane (% By Volume) 9/20/2019	Methane (% By Volume) 12/19/2019	LEL (% By Volume) 4/5/2019	LEL (% By Volume) 6/13/2019	LEL (% By Volume) 9/20/2019	LEL (% By Volume) 12/19/2019	Hydrogen (ppm By Volume) 4/5/2019	Hydrogen (ppm By Volume) 6/13/2019	Hydrogen (ppm By Volume) 9/20/2019	Hydrogen (ppm By Volume) 12/19/2019
GSGM-1A	0	0	0	0	0	0	0	0	0	0	0	0
GSGM-1B	0	0	0	0	0	0	0	0	0	0	0	0
GSGM-1C	0	0	0	0	0	0	0	0	0	0	0	0
GSGM-2A	0	0	0	0	0	0	0	0	0	0	0	0
GSGM-2B	0	0	0	0	0	0	0	0	0	0	0	0
GSGM-2C	0	0	0	0	0	0	0	0	0	0	0	0
GSGM-3A	0	0	0	0	0	0	0	0	0	0	0	0
GSGM-3B	0	0	0	0	0	0	0	0	0	0	0	0
GSGM-4A	0	0	0	0	0	0	0	0	0	0	0	0
GSGM-4B	0	0	0	0	0	0	0	0	0	0	0	0
SGMW-01A	16.2	17.1	6.3	7.9	**>100**	**>100**	**>100**	**>100**	0	2	0	0
SGMW-01B	16.1	16.1	6.5	7.8	**>100**	**>100**	**>100**	**>100**	0	1	0	0
SGMW-01C	12.7	14.4	6.6	6.7	**>100**	**>100**	**>100**	**>100**	0	0	2	0
SGMW-02A	39.5	45.7	12.6	33	**>100**	**>100**	**>100**	**>100**	0	3	0	0
SGMW-02B	39	52.3	46.1	30.5	**>100**	**>100**	**>100**	**>100**	5	17	3	45
SGMW-02C	30.9	45.9	37.4	41.5	**>100**	**>100**	**>100**	**>100**	0	5	0	1
SGMW-03A	24.6	34.1	50.1	10.5	**>100**	**>100**	**>100**	**>100**	2	13	0	0
SGMW-03B	25.8	59.7	48.7	35.6	**>100**	**>100**	**>100**	**>100**	1	30	0	2
SGMW-03C	6.2	45.7	20.5	42.3	**>100**	**>100**	**>100**	**>100**	0	18	0	12
SGMW-04A	37	45.2	0.1	35.8	**>100**	**>100**	2	**>100**	0	1	0	0
SGMW-04B	33.2	42.5	25.5	36.8	**>100**	**>100**	**>100**	**>100**	1	4	0	5
SGMW-04C	18.4	34.9	20.8	28.9	**>100**	**>100**	**>100**	**>100**	0	1	0	3
SGMW-05A	0	28.9	0	0	0	**>100**	0	0	0	1	0	0
SGMW-05B	19.7	30.1	13.3	28.5	**>100**	**>100**	**>100**	**>100**	0	2	0	2
SGMW-05C	16.5	23.7	9.6	18.4	**>100**	**>100**	**>100**	**>100**	0	0	0	3
SGMW-06A	0	0	0	6	0	0	0	**>100**	0	0	0	0
SGMW-06B	31.3	10.7	0	33.1	**>100**	**>100**	0	**>100**	0	0	0	2
SGMW-06C	27.3	33.5	0	30.2	**>100**	**>100**	0	**>100**	0	1	0	3
SGMW-07A	0	0	0	0	0	0	0	0	0	0	0	0
SGMW-07B	0	0	0	0	0	0	0	0	0	0	0	0

Table 8

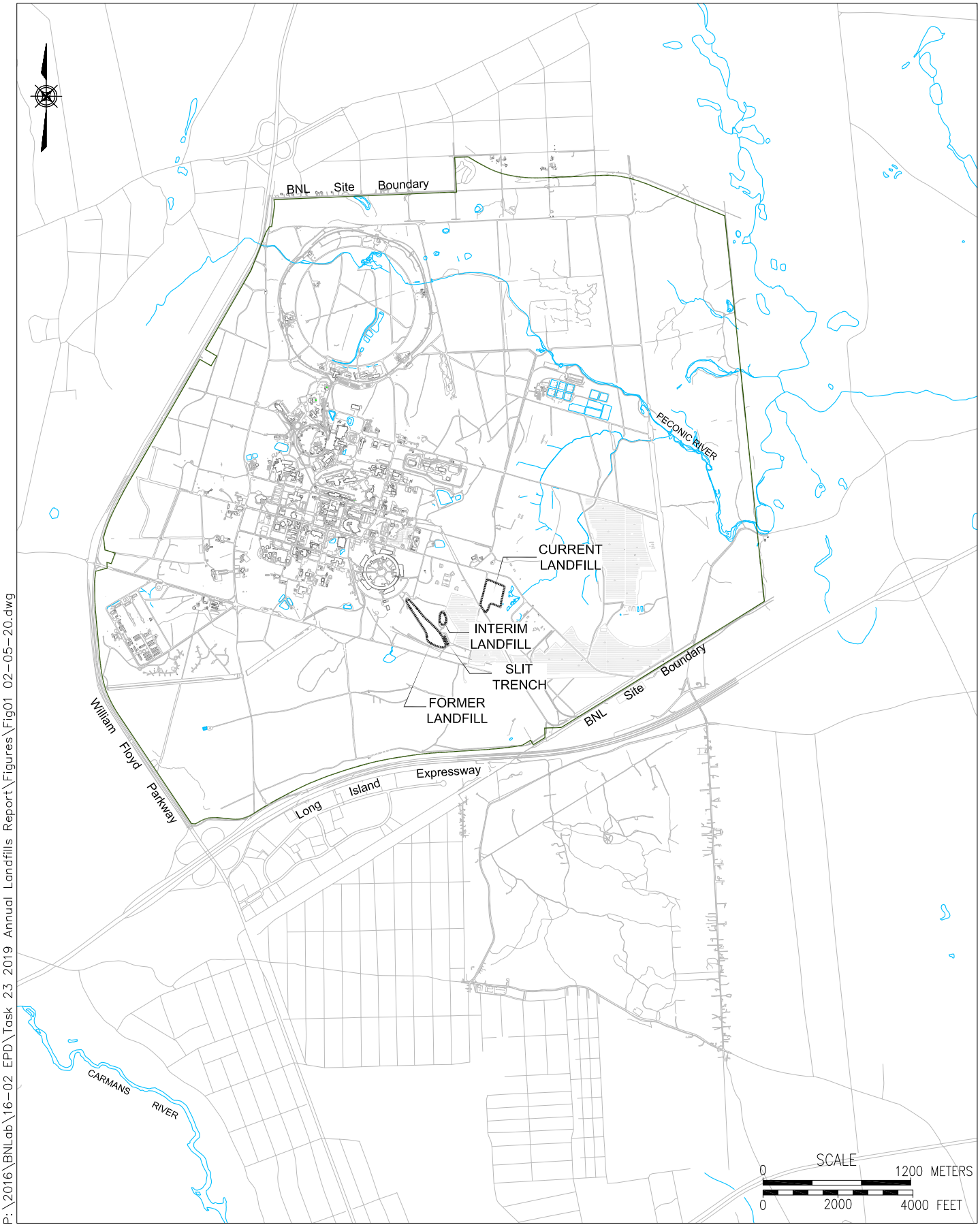
2019 Current Landfill Soil Gas Monitoring Summary Table

Soil/Gas Monitoring Well	Methane (% By Volume) 4/5/2019	Methane (% By Volume) 6/13/2019	Methane (% By Volume) 9/20/2019	Methane (% By Volume) 12/19/2019	LEL (% By Volume) 4/5/2019	LEL (% By Volume) 6/13/2019	LEL (% By Volume) 9/20/2019	LEL (% By Volume) 12/19/2019	Hydrogen (ppm By Volume) 4/5/2019	Hydrogen (ppm By Volume) 6/13/2019	Hydrogen (ppm By Volume) 9/20/2019	Hydrogen (ppm By Volume) 12/19/2019
SGMW-07C	0	0	0	0	0	0	0	0	0	0	0	0
SGMW-08A	0	0	0	0	0	0	0	0	0	0	0	0
SGMW-08B	0	0	0	0	0	0	0	0	0	0	0	0
SGMW-08C	0	0	0	0	0	0	0	0	0	0	0	0
SGMW-09A	0	0	0	0	0	0	0	0	0	0	0	0
SGMW-09B	0	0	0	0	0	0	0	0	0	0	0	0
SGMW-09C	0	0	0	0	0	0	0	0	0	0	0	0
SGMW-10A	0	14.8	3.6	10.1	0	**>100**	72	**>100**	0	15	0	0
SGMW-10B	5.6	14.3	19.1	9.8	**>100**	**>100**	**>100**	**>100**	0	5	3	13
SGMW-10C	5	12.2	10.5	6.9	100	**>100**	**>100**	**>100**	1	0	2	12
SGMW-11A	6.2	16.6	14.1	8.8	**>100**	**>100**	**>100**	**>100**	4	13	14	5
SGMW-11B	4.3	15.4	12.3	7.5	86	**>100**	**>100**	**>100**	0	0	2	0
SGMW-12A	50.5	51.3	36.9	34.4	**>100**	**>100**	**>100**	**>100**	7	21	13	30
SGMW-12B	35.6	0.4	41.9	30.4	**>100**	8	**>100**	**>100**	0	0	3	0
SGMW-13A	0	0	17.8	15.9	0	0	**>100**	**>100**	0	0	0	0
SGMW-13B	0.3	0.1	0	0	6	2	0	0	1	0	0	0
SGMW-14A	0	0	0	0	0	0	0	0	0	0	0	0
SGMW-14B	0.2	0	0	0	4	0	0	0	0	0	0	0
SGMW-15A	0.1	0	0	0	2	0	0	0	0	0	0	0
SGMW-15B	0	0	0	0	0	0	0	0	0	0	0	0
SGMW-16A	0	0	0	0	0	0	0	0	0	0	0	0
SGMW-16B	0	0	0	0	0	0	0	0	0	0	0	0
SGMW-17A	0	0	0	0	0	0	0	0	0	0	0	0
SGMW-17B	0	0	0	0	0	0	0	0	0	0	0	0
SGMW-18A	0	0	0	0	0	0	0	0	0	0	0	0
SGMW-18B	0	0	0	0	0	0	0	0	0	0	0	0
SGMW-19A	0	6.2	0	0	0	**>100**	0	0	0	6	0	0
SGMW-19B	0.1	0	0	0	2	0	0	0	0	0	0	0

Table 9

2019 Former Landfill Soil-Gas Monitoring Summary Table

Soil Gas Monitoring Well	Methane (% By Volume) 8/1/2019	LEL (% By Volume) 8/1/2019	Hydrogen Sulfide (ppm by volume) 8/1/2019
SGMW-01A	0	0	0
SGMW-01B	0	0	0
SGMW-02A	0	0	0
SGMW-02B	0	0	0
SGMW-03A	0	0	0
SGMW-03B	0	0	0
SGMW-04A	0	0	0
SGMW-04B	0	0	0
SGMW-05A	0	0	0
SGMW-05B	0	0	0
SGMW-06A	0	0	0
SGMW-06B	0	0	0
SGMW-07A	0	0	0
SGMW-07B	0	0	0
SGMW-08A	0	0	0
SGMW-08B	0	0	0
SGMW-09A	0	0	0
SGMW-09B	0	0	0
SGMW-10A	0	0	0
SGMW-10B	0	0	0
SGMW-11A	0	0	0
SGMW-11B	0	0	0
SGMW-12A	0	0	0
SGMW-12B	0	0	0



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BROOKHAVEN NATIONAL LABORATORY

ENVIRONMENTAL PROTECTION DIVISION

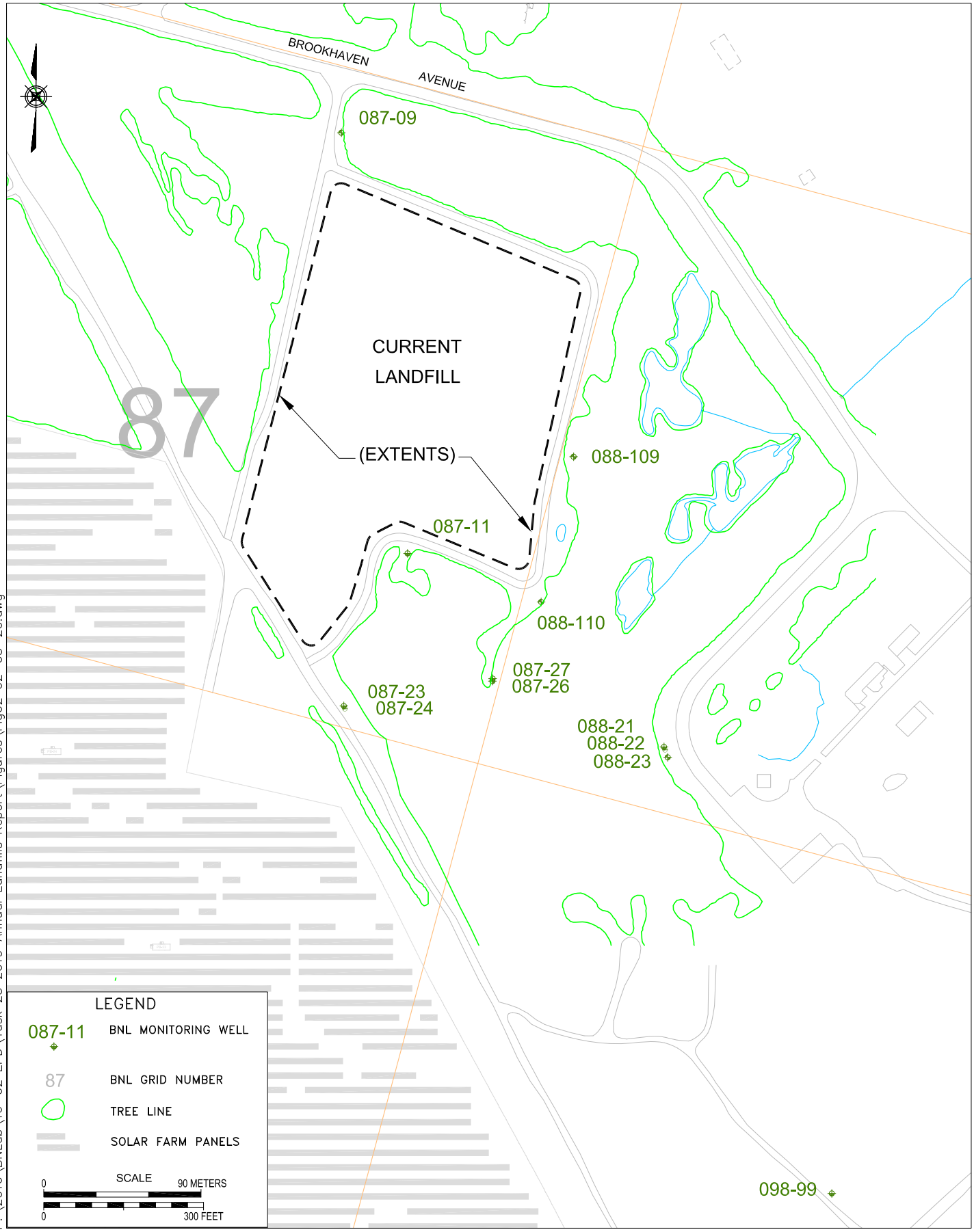
TITLE:

SITE LOCATION MAP

2019 ENVIRONMENTAL MONITORING REPORT
CURRENT AND FORMER LANDFILL AREAS

DWN:	VT: HZ.:	DATE:	PROJECT NO.:
AJZ	–	02/05/20	–
CHKD:	APPD:	REV.:	NOTES:
JM	RFH	–	–

FIGURE NO.: 1



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BROOKHAVEN NATIONAL LABORATORY
ENVIRONMENTAL PROTECTION DIVISION

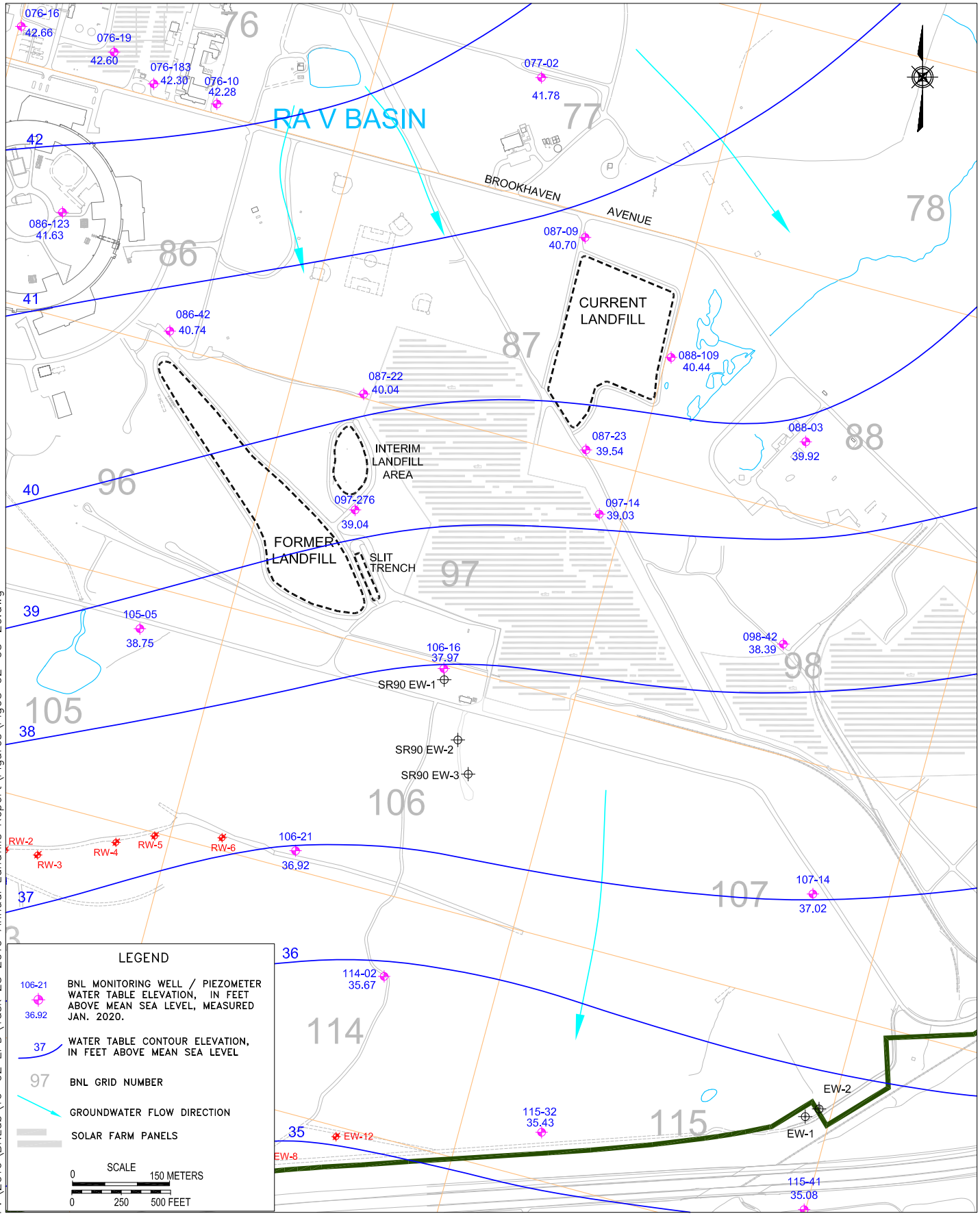
TITLE:

CURRENT LANDFILL MONITORING WELL LOCATIONS

2019 ENVIRONMENTAL MONITORING REPORT
CURRENT AND FORMER LANDFILL AREAS

DWN:	VT: HZ.:	DATE:	PROJECT NO.:
AJZ	–	02/05/20	–
CHKD:	APPD:	REV.:	NOTES:
JM	RFH	–	–

FIGURE NO.: 2



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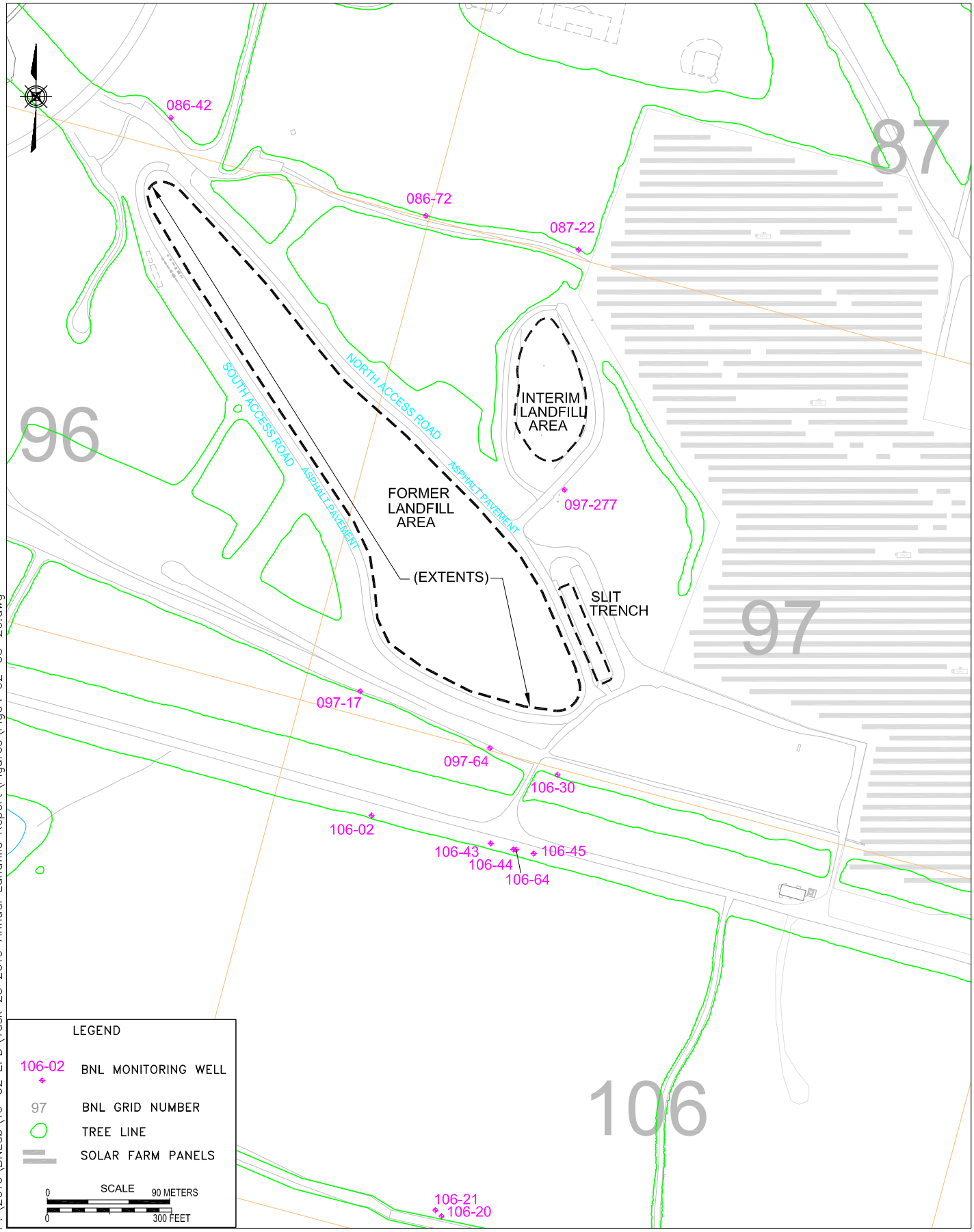
BROOKHAVEN NATIONAL LABORATORY
ENVIRONMENTAL PROTECTION DIVISION

TITLE:

WATER TABLE CONTOUR MAP
2019 ENVIRONMENTAL MONITORING REPORT
CURRENT AND FORMER LANDFILL AREAS

DWN:	VT: HZ.:	DATE:	PROJECT NO.:
AJZ	–	02/13/20	–
CHKD:	APPD:	REV.:	NOTES:
JM	RFH	–	–

FIGURE NO.: 3



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BROOKHAVEN NATIONAL LABORATORY
ENVIRONMENTAL PROTECTION DIVISION

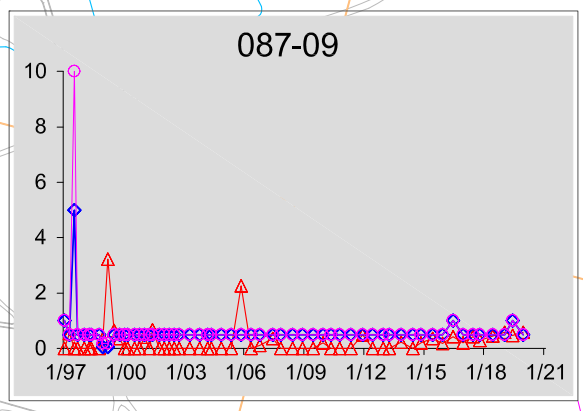
TITLE:

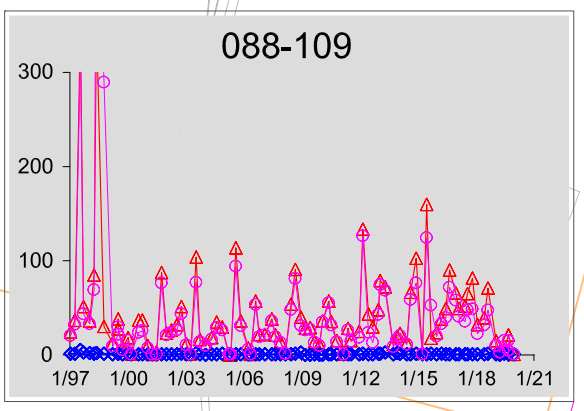
FORMER LANDFILL MONITORING WELL LOCATIONS

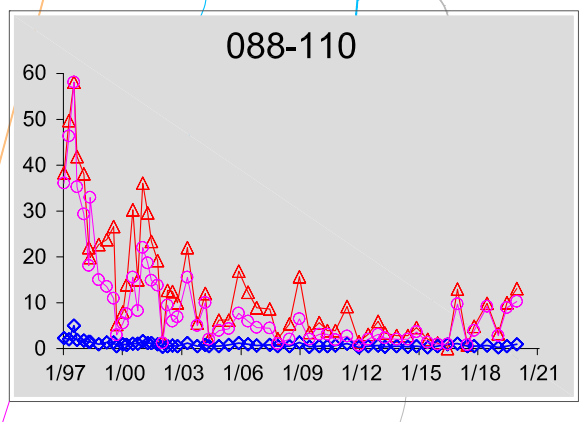
2019 ENVIRONMENTAL MONITORING REPORT
CURRENT AND FORMER LANDFILL AREAS

DWN:	VT: HZ.:	DATE:	PROJECT NO.:
AJZ	–	02/05/20	–
CHKD:	APPD:	REV.:	NOTES:
JM	RFH	–	–

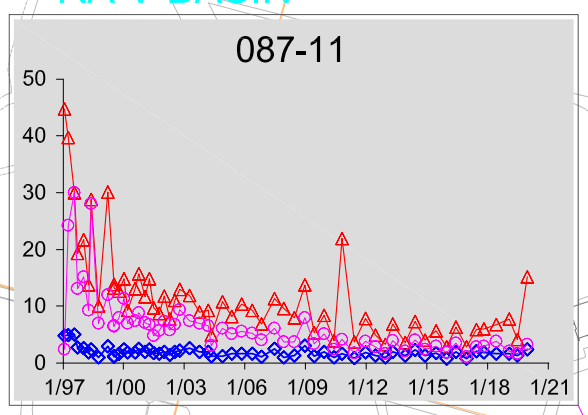
FIGURE NO.: 4

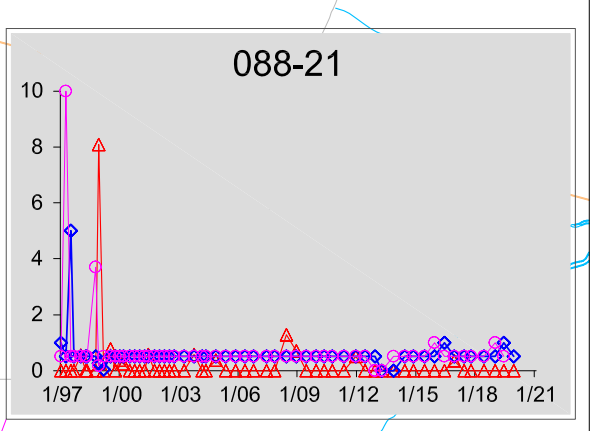






RA V BASIN





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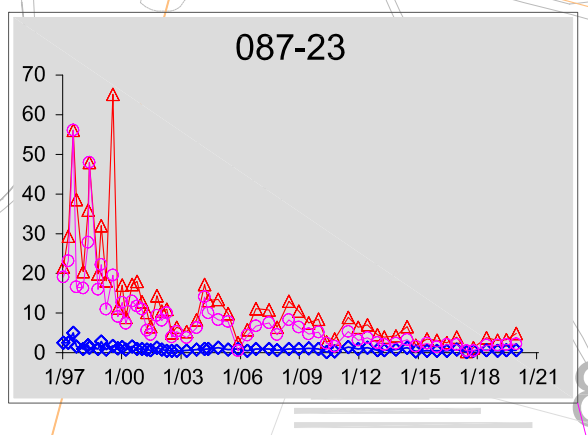
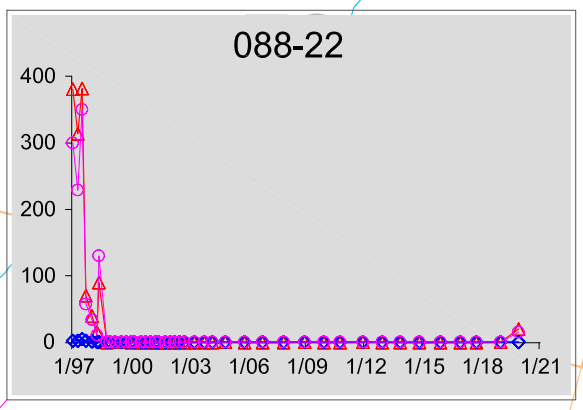




087-09

CURRENT LANDFILL

BROOKHAVEN AVE.

087

088-109

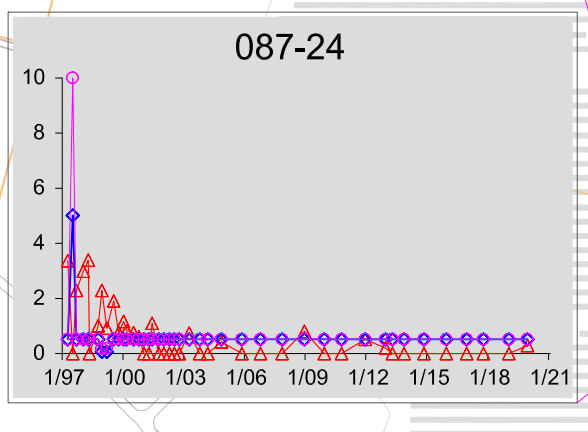
087-11

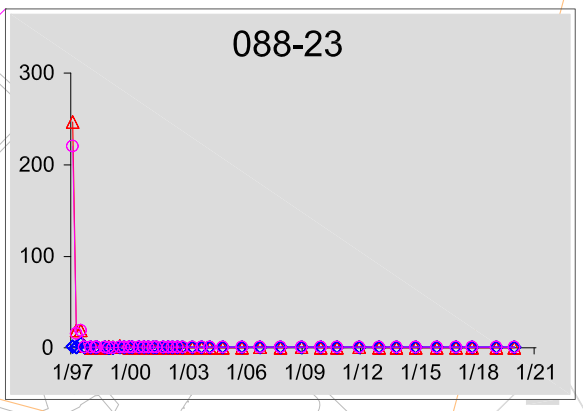
088-110

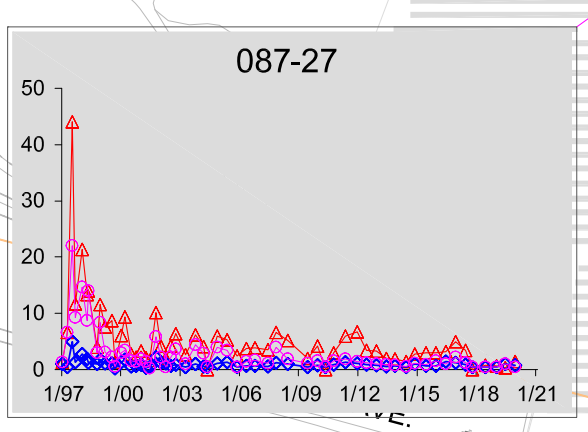
087-23
087-24

087-27
087-26

088-21
088-22
088-23

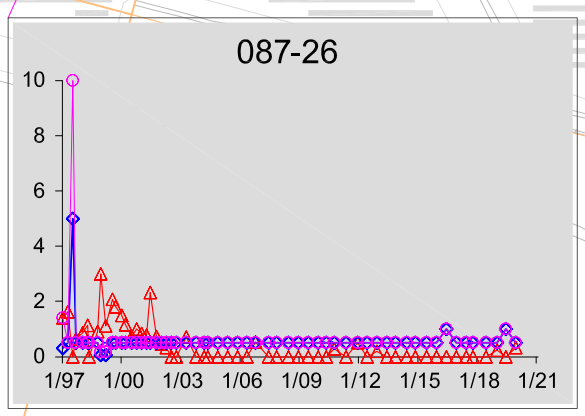


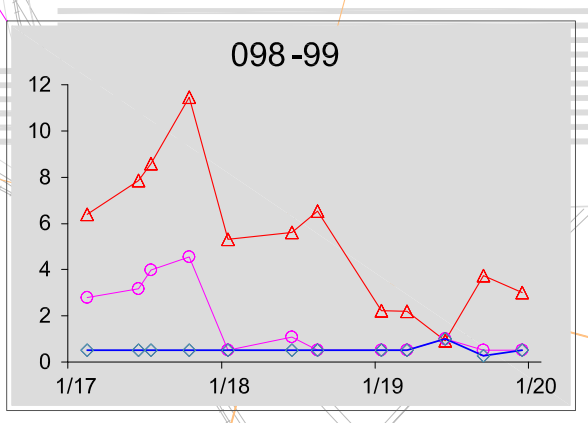




098-99

98





107

LEGEND

- 11 — MONITORING WELL
- Benzene (µG/L)
- Chloroethane (µG/L)
- TVOC (µG/L)
- 87 — BNL GRID NUMBER
- BNL RECHARGE BASIN
- RA V
- 087-09 — BACKGROUND
- 087-11 — DOWNGRADIENT
- SOLAR FARM PANELS

SCALE
0 500 FEET

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BROOKHAVEN NATIONAL LABORATORY
ENVIRONMENTAL PROTECTION DIVISION

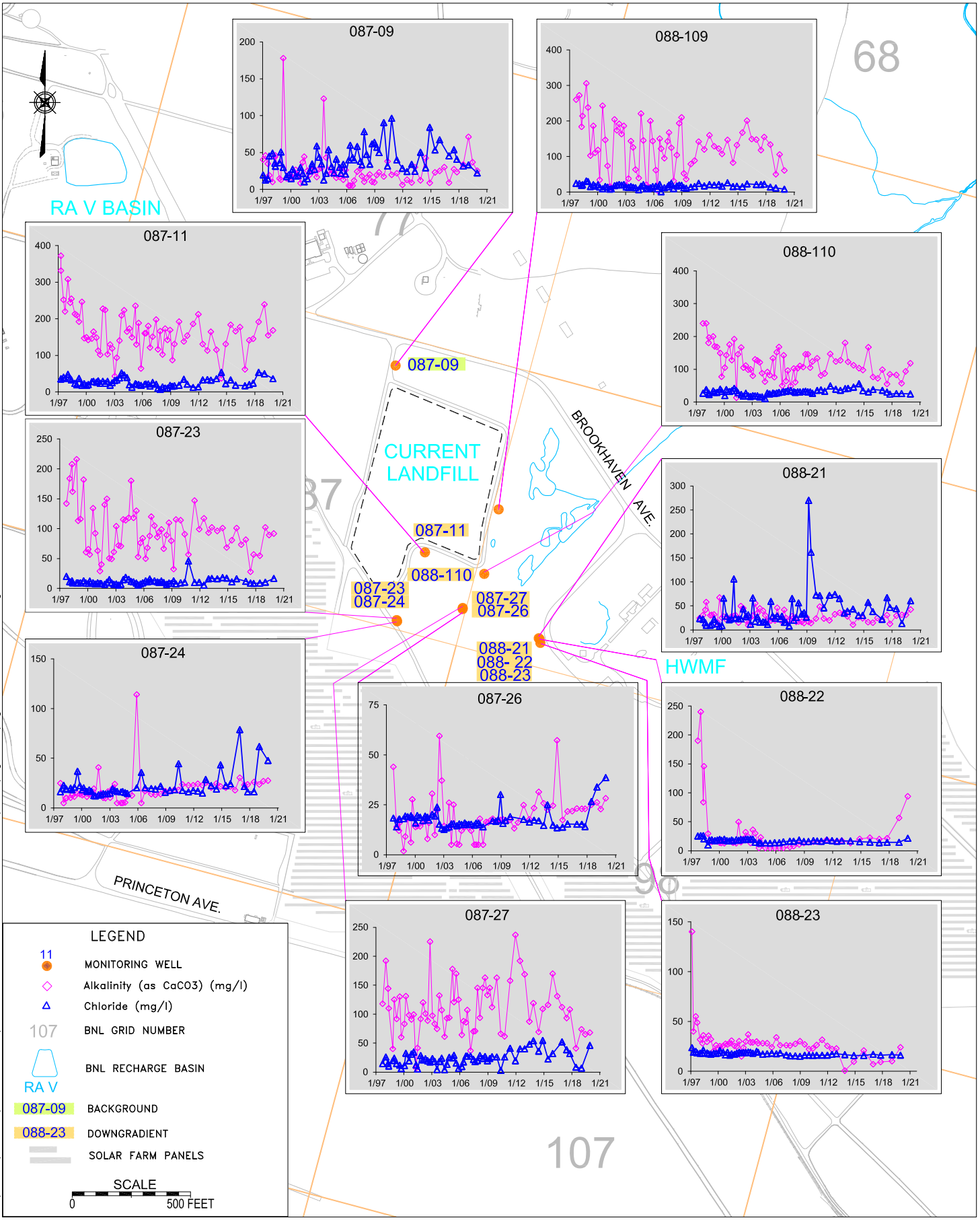
TITLE:

CURRENT LANDFILL VOC TREND PLOTS

2019 ENVIRONMENTAL MONITORING REPORT
CURRENT AND FORMER LANDFILL AREAS

DWN:	VT: HZ.:	DATE:	PROJECT NO.:
AJZ	–	02/05/20	–
CHKD:	APPD:	REV.:	NOTES:
JM	RFH	–	–

FIGURE NO.: 5



BROOKHAVEN NATIONAL LABORATORY
ENVIRONMENTAL PROTECTION DIVISION

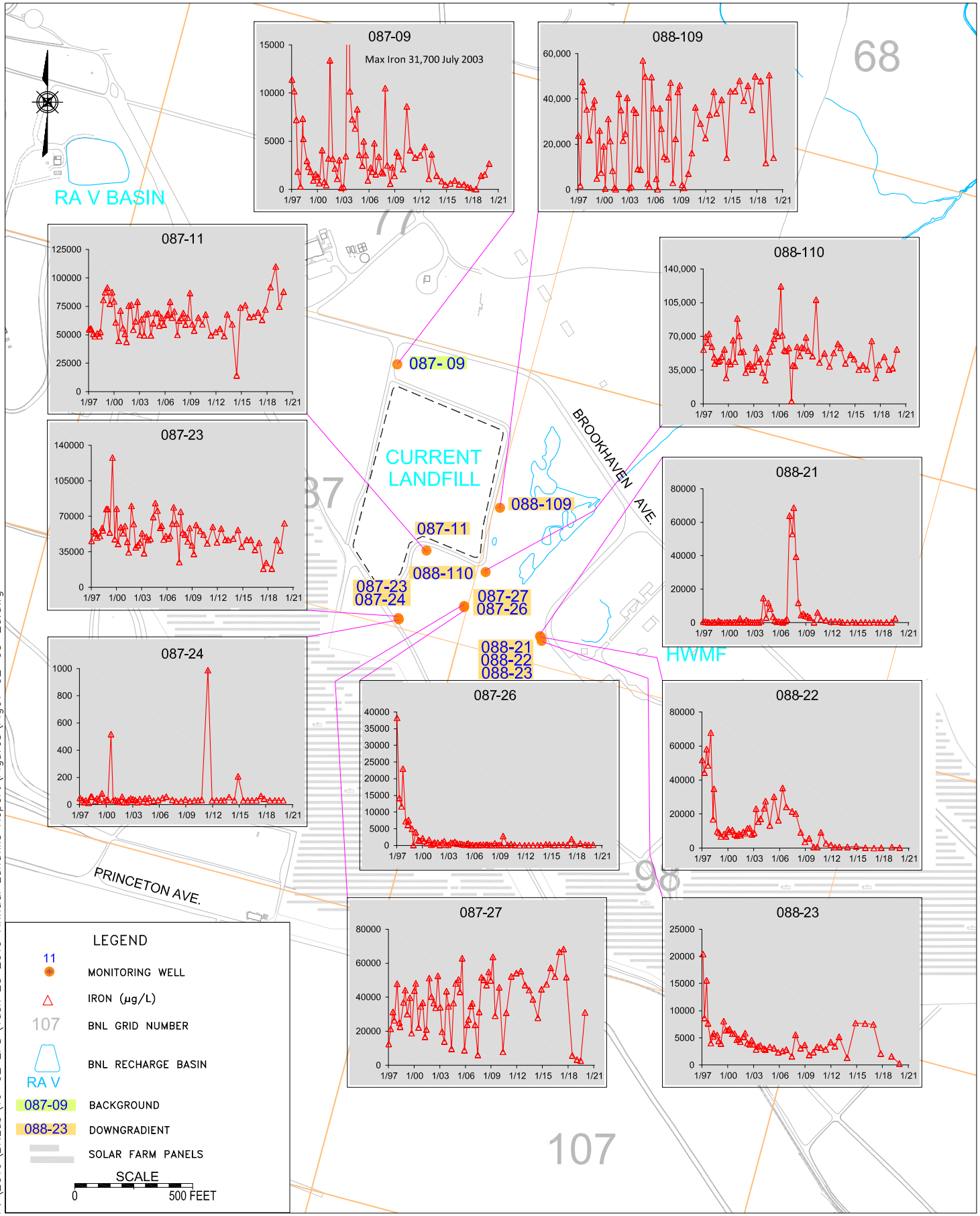
TITLE:

CURRENT LANDFILL ALKALINITY AND CHLORIDE TREND PLOTS

2019 ENVIRONMENTAL MONITORING REPORT
CURRENT AND FORMER LANDFILL AREAS

DWN:	VT: HZ.:	DATE:	PROJECT NO.:
AJZ	–	02/05/20	–
CHKD:	APPD:	REV.:	NOTES:
JM	RFH	–	–

FIGURE NO.: 6



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BROOKHAVEN NATIONAL LABORATORY
ENVIRONMENTAL PROTECTION DIVISION

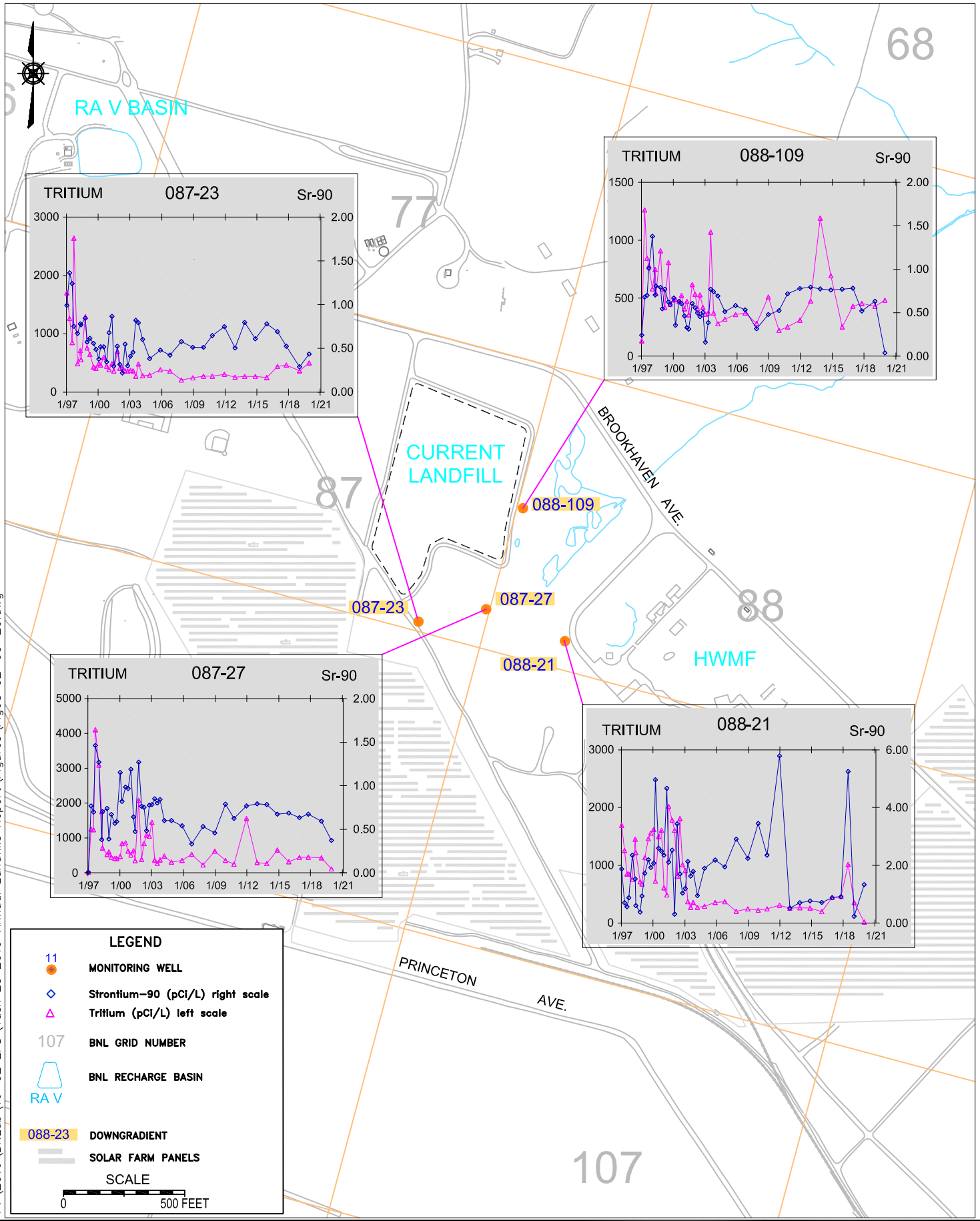
TITLE:

CURRENT LANDFILL IRON TREND PLOTS

2019 ENVIRONMENTAL MONITORING REPORT
CURRENT AND FORMER LANDFILL AREAS

DWN:	VT: HZ.:	DATE:	PROJECT NO.:
AJZ	–	02/05/20	–
CHKD:	APPD:	REV.:	NOTES:
JM	RFH	–	–

FIGURE NO.: 7



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BROOKHAVEN NATIONAL LABORATORY
ENVIRONMENTAL PROTECTION DIVISION

TITLE:

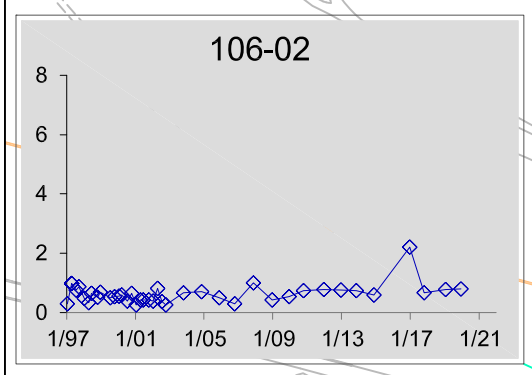
CURRENT LANDFILL TRITIUM AND STRONTIUM-90 TREND PLOTS

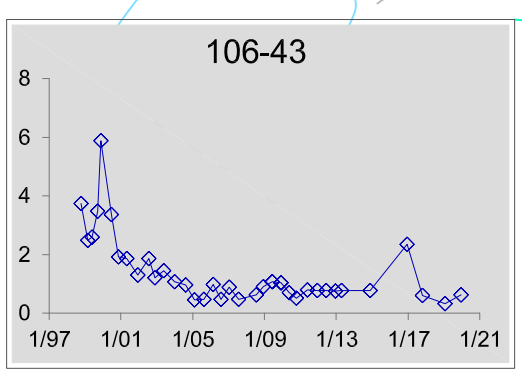
2019 ENVIRONMENTAL MONITORING REPORT
CURRENT AND FORMER LANDFILL AREAS

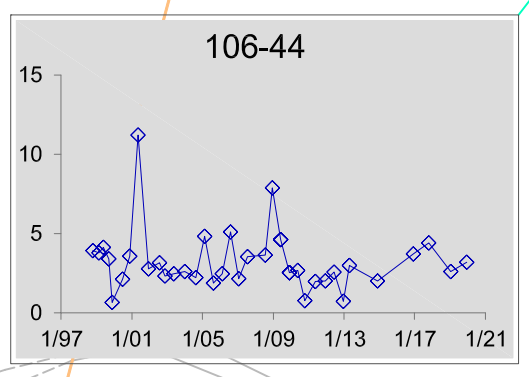
DWN:	VT: HZ.:	DATE:	PROJECT NO.:
AJZ	–	02/05/20	–
CHKD:	APPD:	REV.:	NOTES:
JM	RFH	–	–

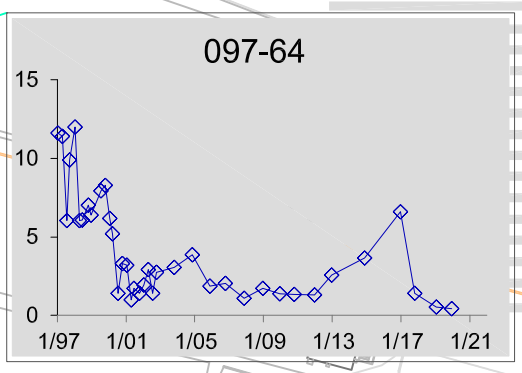
FIGURE NO.: 8

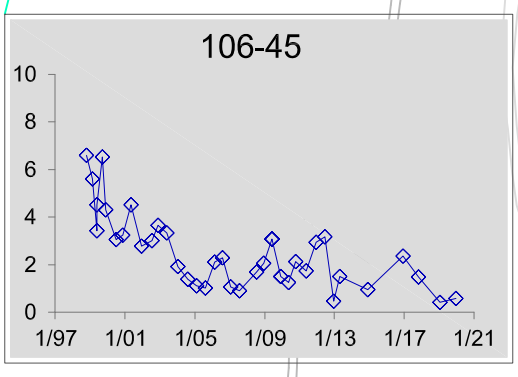
086-42
086-72
087-22
INTERIM
LANDFILL
097277
GLASS
HOLES
96
97
FORMER
LANDFILL
SLIT TRENCH
097-17
097-64
106-30
106-02
106-44
106-64
106-43
106-45
PRINCETON AVE.
106-21
106-20











LEGEND

17 MONITORING WELL

◇ Strontium-90 (pCi/L)

96 BNL GRID NUMBER

SOLAR FARM PANELS

086-42 BACKGROUND

106-02 DOWNGRADIENT

SCALE
0 250 FEET

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BROOKHAVEN NATIONAL LABORATORY
ENVIRONMENTAL PROTECTION DIVISION

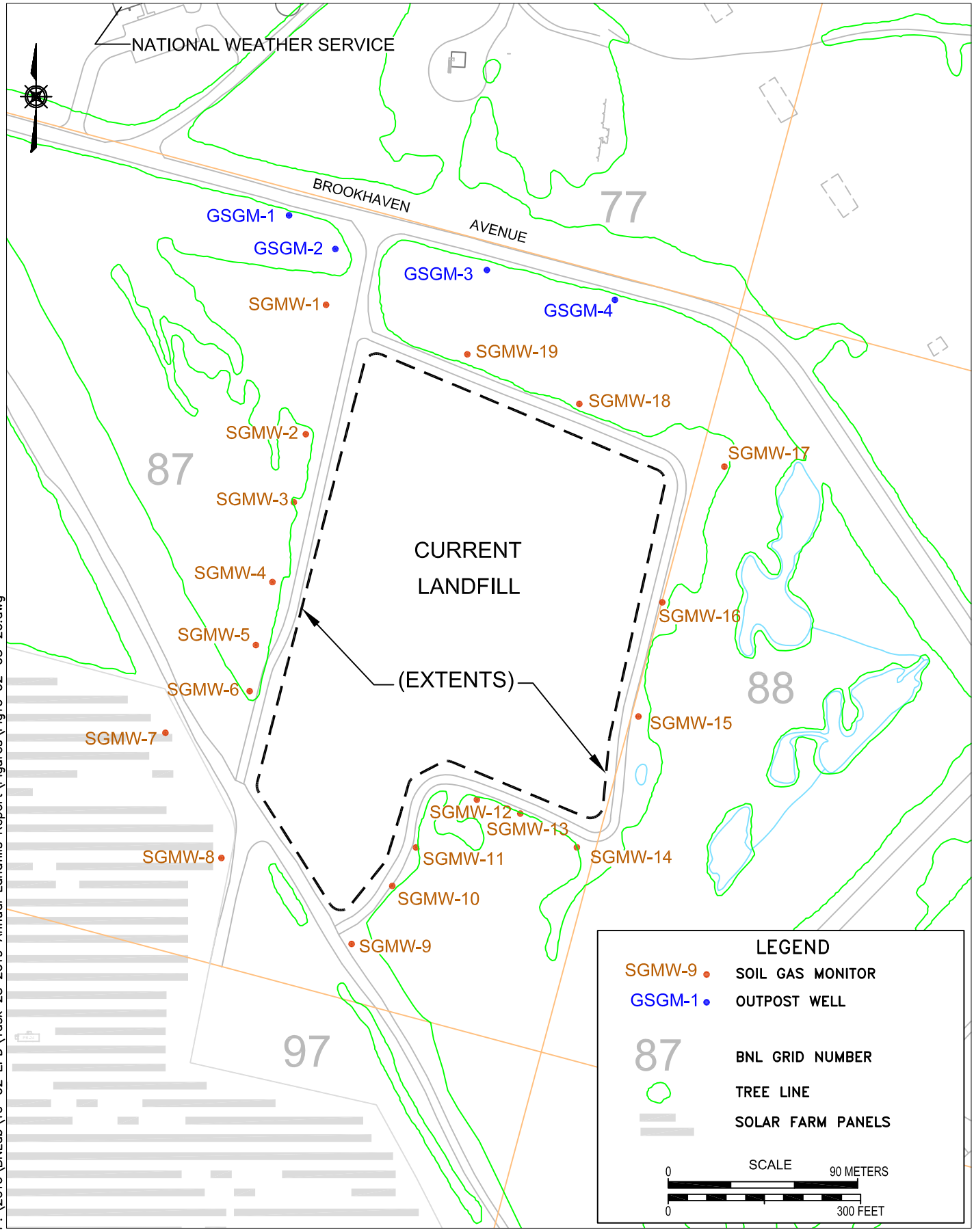
TITLE:

FORMER LANDFILL AREA STRONTIUM-90 TREND PLOTS

2019 ENVIRONMENTAL MONITORING REPORT
CURRENT AND FORMER LANDFILL AREAS

DWN:	VS: HS.:	DATE:	PROJECT NO.:
AJZ	–	02/05/20	–
CHKD:	APPD:	REV.:	NOTES:
JM	RFH	–	–

FIGURE NO.: 9



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BROOKHAVEN NATIONAL LABORATORY
ENVIRONMENTAL PROTECTION DIVISION

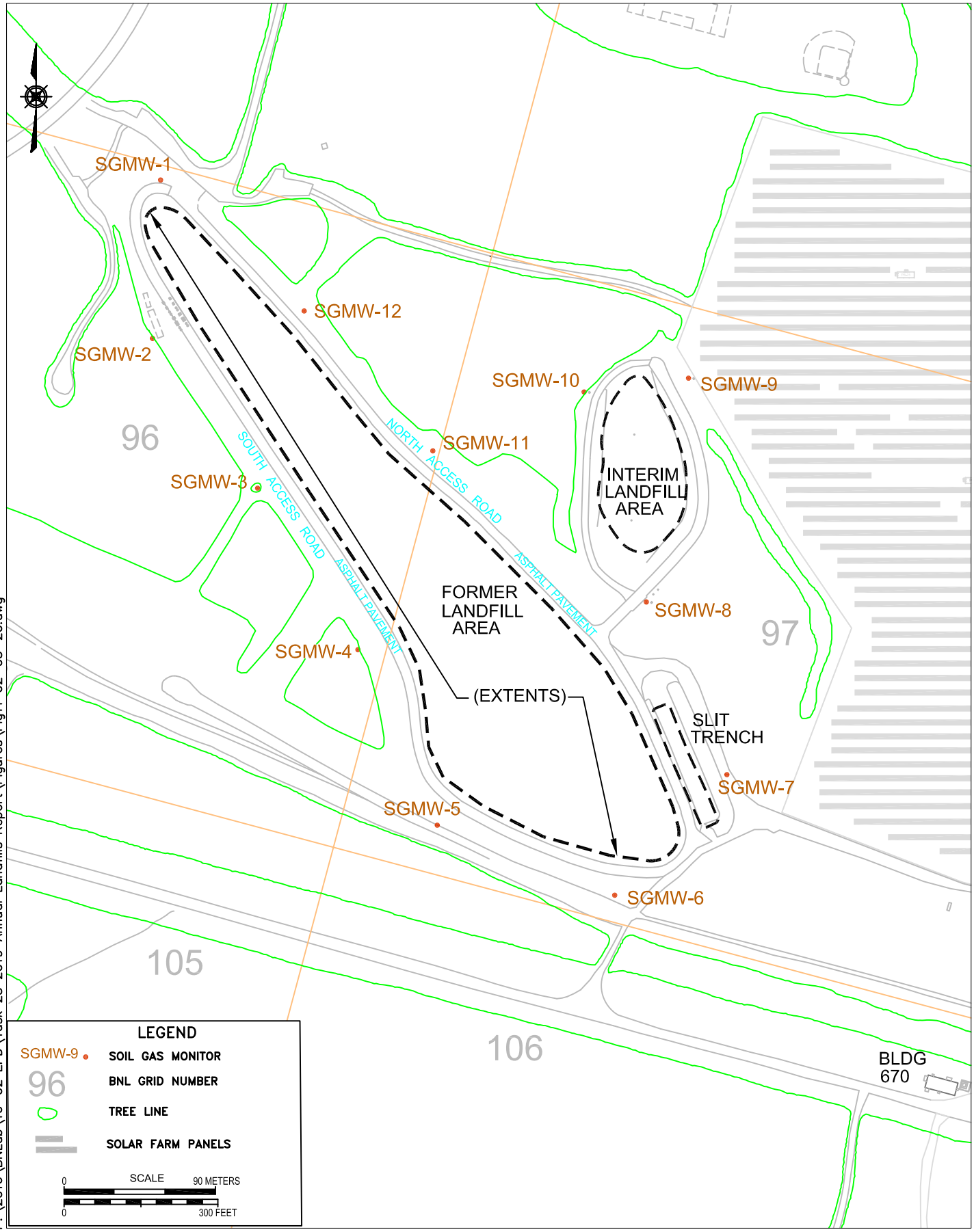
TITLE:

CURRENT LANDFILL SOIL-GAS MONITOR LOCATION MAP

2019 ENVIRONMENTAL MONITORING REPORT
CURRENT AND FORMER LANDFILL AREAS

DWN:	VT: HZ.:	DATE:	PROJECT NO.:
AJZ	–	02/05/20	–
CHKD:	APPD:	REV.:	NOTES:
JM	RFH	–	–

FIGURE NO.: 10



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BROOKHAVEN NATIONAL LABORATORY
ENVIRONMENTAL PROTECTION DIVISION

TITLE:

FORMER LANDFILL AREA SOIL-GAS MONITOR LOCATION MAP

2019 ENVIRONMENTAL MONITORING REPORT
CURRENT AND FORMER LANDFILL AREAS

DWN:	VT: HZ.:	DATE:	PROJECT NO.:
AJZ	–	02/05/20	–
CHKD:	APPD:	REV.:	NOTES:
JM	RFH	–	–

FIGURE NO.: 11

Appendix A

Soil-gas Sampling Field Notes

(148) 4/4/19 Clock — Current Landfill — 30.21 "Hg Sunny 58

Location	Well ID	CH4%	LEL%	H2S	Comments
Sum - 1A	087-62	16.2	>100 321	0	0902
1B	087-77	16.1	>100 322	0	0912
1C	087-79	12.7	>100 254	0	0922
2A	087-63	39.5	>100 790	0	0929
2B	087-80	39.0	>100 780	5	0935
2C	087-81	30.9	>100 618	0	0945
3A	087-64	24.6	>100 492	2	0956
3B	087-82	25.1	>100 516	1	1010
3C	087-83	6.2	>100 124	0	1020
4A	087-65	37.0	>100 740	0	1026
4B	087-84	33.2	>100 664	1	1036
4C	087-85	18.4	>100 368	0	1046
5A	087-66	0	0	0	1050
5B	087-86	19.7	>100 394	0	1100
5C	087-87	16.5	>100 330	0	1110
6A	087-67	0	0	0	1116
6B	087-88	31.3	>100 626	0	1124
6C	087-89	27.3	>100 546	0	1134
4/5 7A	087-68	0	0	0	1300
7B	087-90	0	0	0	1306
7C	087-91	0	0	0	1316
8A	087-69	0	0	0	1320
8B	087-92	0	0	0	1328
8C	087-93	0	0	0	1338

4/4/19 - 4/5/19 Current Landfill (149)

Location	Well ID	CH4%	LEL%	H2S	Comments
Sum 9A	087-70	0	0	0	1302
9B	087-94	0	0	0	1308
9C	087-95	0	0	0	1318
10A	087-71	0	0	0	1322
10B	087-96	5.6	>100 112	0	1329
10C	087-97	5.0	>100 100	1	1339
11A	087-72	6.2	>100 124	4	1400
11B	087-98	4.3	>100 86	0	1406
12A	087-73	50.5	>100 1010	7	1416
12B	087-99	35.6	>100 712	0	1423
13A	087-74	0	0	0	1433
13B	087-100	0.3	>100 6	1	1439
14A	087-75	0	0	0	1444
14B	087-101	0.2	3	0	1452
15A	088-111	0.1	2	0	1502
15B	088-114	0	0	0	1512
16A	088-112	0	0	0	1522
16B	088-115	0	0	0	water 1531
17A	088-113	0	0	0	water 1348
17B	088-116	0	0	0	water 1355
18A	087-71	0	0	0	water 1405
18B	087-102	0	0	0	1415
19A	087-77	0	0	0	1310
19B	087-103	0.1	2	0	1325 4/5

(150)

Current Landfill

Location	4/5/14 Well ID	CH_4 %	LOC^{2} %	H_2S	Time/Temp
GGBM 1A	NO ID	0	0	0	1535
1B		0	0	0	1525
1C		0	0	0	1515
2A		0	0	0	1500
2B		0	0	0	1445
2C		0	0	0	1435
3A		0	0	0	1420
3B		0	0	0	1403
4A		0	0	0	1410
4B		0	0	0	1415

4/5/14 Current Landfill

(150) Location	Well ID	CH_4 %	CO_2 %	H2S	Time/comments
SGum 1A	No ID	0	0	0	1535
1B		0	0	0	1525
1C		0	0	0	1515
2A		0	0	0	1500
2B		0	0	0	1445
2C		0	0	0	1435
3A		0	0	0	1420
3B		0	0	0	1403
4A		0	0	0	1410
4B		0	0	0	1415

4/12/14 74° 50% 1023mb Current Landfill

Location	Well ID	CH_4 %	CO_2 %	H2S
SGum - 1A	087-62	17.1	>100 342	2
1B	087-78	16.1	>100 322	7
1C	087-79	14.4	>100 288	0
2A	087-63	45.7	>100 914	3
2B	087-80	52.3	>100 1046	17
2C	087-81	45.9	>100 918	5
3A	087-64	34.1	>100 682	13
3B	087-82	59.7	>100 1154	30
3C	087-83	45.7	>100 914	18
4A	087-65	45.2	>100 904	1
4B	087-84	42.5	>100 850	4
4C	087-85	34.9	>100 698	1
5A	087-66	28.9	>100 578	1
5B	087-86	30.1	>100 602	2
5C	087-87	23.7	>100 474	0
6A	087-67	0	0	0
6B	087-88	10.7	>100 214	0
6C	087-89	33.5	>100 670	1
7A	087-68	0	0	0
7B	087-90	0	0	0
7C	087-91	0	0	0
8A	087-69	0	0	0
8B	087-92	0	0	0
8C	087-93	0	0	0

6/13/14 BP

Location	Well ID	Current Landfill CH4%	LEL%	H2S	Time for 6/12/19
SCM 9A	087-70	0	0	0	1520
9B	087-94	0	0	0	1527
9C	087-95	0	0	0	1537
10A	087-71	14.8	>100 296	15	1305
10B	087-96	14.3	>100 286	5	1312
10C	087-97	12.2	>100 244	0	1329
11A	087-72	16.6	>100 332	13	1340
11B	087-98	15.4	>100 308	0	1350
12A	087-73	51.3	>100 1026	21	1354
12B	087-99	0.4	10	0	Water in Pipe 1359
13A	087-74	0	0	0	1404
13B	087-100	0.1	1	0	Water in Pipe 1410
14A	087-75	0.0	1	0	1415
14B	087-101	0	0	0	1422
15A	088-111	0	0	0	1426
15B	088-114	0	0	0	1433
16A	088-112	0	0	0	1438
16B	088-115	0	0	0	Water in Pipe 1441
17A	088-113	0	0	0	1443
17B	088-116	0	0	0	Water in Pipe 1448
18A	087-76	0	0	0	1450
18B	087-102	0	0	0	Water in Pipe 1500
19A	087-77	6.2	7100 124	6	1507
19B	087-103	0	0	0	Water in Pipe 1514

Current Landfill 6/13/19 (15)

Location	Well ID	CH4%	LEL%	H2S	Time
GCCCM 1A	N/A	0	0	0	1510
1B		0	0	0	1505
1C		0	0	0	1449
2A		0	0	0	1440
2B		0	0	0	1432
2C		0	0	0	1426
3A		0	0	0	1416
3B		0	0	0	1410
4A		0	0	0	1400
4B		0	0	0	1405

6/13/19

Sunny clear — Current Landfill — 9/14/19 — 50° — 47%

(154)

Location	Well ID	CH4 %	LEL %	H2S	Time
Sum - 1A	087-62	6.3	>100 [126]	0	0805
1B	087-78	6.5	>100 [130]	0	0815
1C	087-79	6.6	>100 [132]	2	0825
2A	087-63	12.6	>100 [252]	0	0830
2B	087-80	46.1	>100 [922]	3	0836
2C	087-81	37.4	>100 [748]	0	0846
3A	087-64	50.1	>100 [1002]	0	0850
3B	087-82	48.7	>100 [974]	0	0856
3C	087-83	20.5	>100 [410]	0	0906
4A	087-65	0.1	3 [6]	0	0909
4B	087-84	25.5	>100 [510]	0	0915
4C	087-85	20.8	>100 [416]	0	0925
5A	087-66	0	0	0	0945
5B	087-86	13.3	>100 [266]	0	0952
5C	087-87	9.6	>100 [192]	0	1002
6A	087-67	0	0	0	1006
6B	087-88	0	0	0	1015
6C	087-89	0	0	0	1025
7A	087-68	0	0	0	0815
7B	087-90	0	0	0	0826
7C	087-91	0	0	0	0836
8A	087-69	0	0	0	0840
8B	087-92	0	0	0	0847
8C	087-93	0	0	0	0857

9/14/19 — Current Landfill

(155)

Location	Well ID	CH4 %	LEL %	H2S	Time
9A	087-70	0	0	0	1440
9B	087-94	0	0	0	1450
9C	087-95	0	0	0	1459
10A	087-71	3.6	62	0	1500
10B	087-96	19.1	>100 [382]	3	1108
10C	087-97	10.5	>100 [210]	2	1118
11A	087-72	14.1	>100 [282]	14	1122
11B	087-98	12.3	>100 [246]	2	1130
12A	087-73	36.9	>100 [738]	13	1140
12B	087-99	41.9	>100 [838]	3	1150
13A	087-74	17.8	>100 [356]	0	1305
13B	087-100	0	0	0	1313
14A	087-75	0	0	0	1319
14B	087-101	0	0	0	1329
15A	088-111	0	0	0	1336
15B	088-114	0	0	0	1343 Water
16A	088-112	0	0	0	1346
16B	088-115	0	0	0	1352 Water
17A	088-113	0	0	0	1356
17B	088-116	0	0	0	1406 Water
18A	087-76	0	0	0	1412
18B	087-102	0	0	0	1421 Water
19A	087-77	0	0	0	1425
19B	087-103	0	0	0	1432

(156)

Current Launch 9/20/19

		WELL	CH4%	LEL%	H2S	Time
G5Lm	1A	NSD	0	0	0	1105
	1B		0	0	0	1055
	1C		0	0	0	1045
	2A		0	0	0	1035
	2B		0	0	0	1030
	2C		0	0	0	1025
	3A		0	0	0	1015
	3B		0	0	0	1010
	4A		0	0	0	0958
	4B		0	0	0	0950

9/20/19

2

12/18/19

Current Landfill

29.71 Hg 32° Sunny

Cal clear Gas zero

Location	Well ID	CH4 %	LEL %	H2S PPM	Time/comments
SGA - 1A	087-62	7.9	>100 158	2	0840
1B	087-78	7.8	>100 156	0	0846
1C	087-79	6.7	>100 134	0	0856
2A	087-63	33	>100 660	0	0905
2B	087-80	30.5	>100 610	45	0918
2C	087-81	41.5	>100 830	1	0928
3A	087-64	10.5	>100 210	0	0933
3B	087-82	35.6	>100 712	2	0940
3C	087-83	42.3	>100 846	12	0952
4A	087-65	35.8	>100 716	0	0959
4B	087-84	36.8	>100 736	5	1005
4C	087-85	28.9	>100 577	3	1015
5A	087-66	0	0	0	1020
5B	087-86	28.5	>100 570	2	1027
5C	087-87	18.4	>100 368	3	1037
6A	087-67	6.0	>100 120	0	1040
6B	087-88	33.1	>100 662	2	1050
6C	087-89	30.2	>100 604	3	1102
7A	087-68	0	0	0	0845
7B	087-90	0	0	0	0851
7C	087-91	0	0	0	0905

12/19

Current Landfill

Location	Well ID	CH4 %	LEL %	H2S	Time
SGA - 8A	087-69	0	0	0	0815
8B	087-92	0	0	0	0925 12/19
8C	087-93	0	0	0	0935
9A	087-70	0	0	0	1200
9B	087-94	0	0	0	1148
9C	087-95	0	0	0	1138
10A	087-71	10.1	>100 202	0	1108
10B	087-96	9.8	>100 196	13	1118
10C	087-97	6.9	>100 138	12	1128
11A	087-72	8.8	>100 176	5	1320
11B	087-98	7.5	>100 150	0	1330
12A	087-73	34.4	>100 688	30	1343
12B	087-99	30.4	>100 608	0	1353
13A	087-74	15.9	>100 318	0	1400
13B	087-100	0	0	0	1408
14A	087-75	0	0	0	1413
14B	087-101	0	0	0	1420
15A	088-111	0	0	0	1425 water on
15B	088-114	0	0	0	1433
16A	088-112	0	0	0	1440 water
16B	088-115	0	0	0	1446 water
17A	088-113	0	0	0	1451 water
17B	088-116	0	0	0	1454 water
18A	087-76	0	0	0	1459 water
18B	087-102	0	0	0	1508 water
19A	087-77	0	0	0	1517
19B	087-103	0	0	0	1525 Rain in the Rain

17° clear

Current Landfill

12/19/14

Location	Well ID	CH4 %	LEL %	H2S	Time
GCCM 1A	NA	0	0	0	1050
1B		0	0	0	1045
1C		0	0	0	1039
2A		0	0	0	1030
2B		0	0	0	1025
2C		0	0	0	1019
3A		0	0	0	1009
3B		0	0	0	0958
~~4B~~		0	0	0	0951
4B		0	0	0	0945

(45) 8/1/19 JM Former Landfill 82° 44% 1014 mB

Location	Well ID	CH4 %	LEL %	H2S PPM	Time
1A	096-41	0	0	0	0920
1B	096-42	0	0	0	0932
2A	096-43	0	0	0	0945
2B	096-44	0	0	0	0954
3A	096-45	0	0	0	1002
3B	096-46	0	0	0	1010
4A	096-47	0	0	0	1028
4B	096-48	0	0	0	1035
5A	097-50	0	0	0	1043
5B	097-51	0	0	0	1049
6A	097-52	0	0	0	1056
6B	097-53	0	0	0	1100
7A	097-54	0	0	0	1108
7B	097-55	0	0	0	1118
8A	097-56	0	0	0	1123
8B	097-57	0	0	0	1135
9A	097-58	0	0	0	1140
9B	097-59	0	0	0	1145

8/1/19

8/1/19 JM Former Landfill Cal check Gen 2000 (46)

Location	Well ID	CH4 %	LEL %	H2S PPM	Time
SGM 10A	097-60	0	0	0	1149
10B	097-61	0	0	0	1155
11A	097-62	0	0	0	1310
11B	097-63	0	0	0	1318
12A	096-49	0	0	0	1325
12B	096-50	0	0	0	1335

8/1/19

Appendix B

Monthly Landfill Site Inspection Forms

BROOKHAVEN NATIONAL LABORATORY
CURRENT LANDFILL AREA
SITE INSPECTION FORM

Name of Inspector(s): Eric Kramer

Date of Inspection: 1-29-19

Purpose of Inspection: ___ Routine ___ Heavy Rainfall ___ Reported Incident

Time on Site: _____

Time off Site: _____

Weather Conditions: _____

A. Inspection Checklist

	Component	Observed Condition			Further Action Required	
		Excellent	Fair	Poor	Yes	No
1.0	**Landfill Cap:**					
	Vegetation	X				X
	Cap	X				X
	Gas Vents	X				X
2.0	**Drainage Structures:**					
	Toe Drain	X				X
	Drainage Channels	X				X
	French Drains/Outfalls	X				X
	Subsurface Drainage Pipes/Outfalls	X				X
	Manholes	X				X
	Recharge Areas	X				X
	Monitoring System:					
	Soil Gas Wells	X				X
	Groundwater Wells	X				X
4.0	**Site Access:**					
	Asphalt Access Road	X				X
	Crushed-Concrete Access Road	X				X

B. Description of Further Action Requirements:

1. Location: All OK

Observed Conditions:

Recommendations:

BROOKHAVEN NATIONAL LABORATORY
CURRENT LANDFILL AREA
SITE INSPECTION FORM

Name of Inspector(s): Eric Kraner

Date of Inspection: 2-26-19

Purpose of Inspection: ✓ Routine ___ Heavy Rainfall ___ Reported Incident

Time on Site: _____

Time off Site: _____

Weather Conditions: _____

A. Inspection Checklist

	Component	Observed Condition			Further Action Required	
		Excellent	Fair	Poor	Yes	No
1.0	**Landfill Cap:**					
	Vegetation	✓				✓
	Cap	✓				✓
	Gas Vents					
2.0	**Drainage Structures:**					
	Toe Drain	✓				✓
	Drainage Channels					
	French Drains/Outfalls	✓				✓
	Subsurface Drainage Pipes/Outfalls					
	Manholes	✓				✓
	Recharge Areas					
	Monitoring System:					
	Soil Gas Wells	✓				✓
	Groundwater Wells					
4.0	**Site Access:**					
	Asphalt Access Road	✓				✓
	Crushed-Concrete Access Road					

B. Description of Further Action Requirements:

1. Location: All O.K.

Observed Conditions: _____

Recommendations: _____

BROOKHAVEN NATIONAL LABORATORY
CURRENT LANDFILL AREA
SITE INSPECTION FORM

Name of Inspector(s): Eric Kramer

Date of Inspection: 3-28-19

Purpose of Inspection: ✓ Routine ___ Heavy Rainfall ___ Reported Incident

Time on Site: ___ ___

Time off Site: ___ ___

Weather Conditions: ___

A. Inspection Checklist

	Component	Observed Condition			Further Action Required	
		Excellent	Fair	Poor	Yes	No
1.0	**Landfill Cap:**					
	Vegetation	✓				✓
	Cap	✓				✓
	Gas Vents	✓				✓
2.0	**Drainage Structures:**					
	Toe Drain	✓				✓
	Drainage Channels	✓				✓
	French Drains/Outfalls	✓				✓
	Subsurface Drainage Pipes/Outfalls	✓				✓
	Manholes	✓				✓
	Recharge Areas	✓				✓
	Monitoring System:					
	Soil Gas Wells	✓				✓
	Groundwater Wells	✓				✓
4.0	**Site Access:**					
	Asphalt Access Road	✓				✓
	Crushed-Concrete Access Road	✓				✓

B. Description of Further Action Requirements:

1. Location: All OK

Observed Conditions: ___

Recommendations: ___

BROOKHAVEN NATIONAL LABORATORY
CURRENT LANDFILL AREA
SITE INSPECTION FORM

Name of Inspector(s): Eric Kramer

Date of Inspection: 4-25-19

Purpose of Inspection: ✓ Routine ___ Heavy Rainfall ___ Reported Incident

Time on Site: _____

Time off Site: _____

Weather Conditions: _____

A. Inspection Checklist

	Component	Observed Condition			Further Action Required	
		Excellent	Fair	Poor	Yes	No
1.0	**Landfill Cap:**					
	Vegetation		✓			✓
	Cap	✓				✓
	Gas Vents	✓				✓
2.0	**Drainage Structures:**					
	Toe Drain	✓				✓
	Drainage Channels		✓			✓
	French Drains/Outfalls	✓				✓
	Subsurface Drainage Pipes/Outfalls	✓				✓
	Manholes	✓				✓
	Recharge Areas	✓				✓
	Monitoring System:					
	Soil Gas Wells	✓				✓
	Groundwater Wells	✓				✓
4.0	**Site Access:**					
	Asphalt Access Road		✓			✓
	Crushed-Concrete Access Road	✓				✓

B. Description of Further Action Requirements:

1. Location: Drainage Channels, Roads

Observed Conditions: Some Vegetation Growth. Monitor + call Grounds to cut when needed

Recommendations:

BROOKHAVEN NATIONAL LABORATORY
CURRENT LANDFILL AREA
SITE INSPECTION FORM

Name of Inspector(s): Eric Kramer

Date of Inspection: 5-29-19

Purpose of Inspection: ✓ Routine ___ Heavy Rainfall ___ Reported Incident

Time on Site: _____

Time off Site: _____

Weather Conditions: _____

A. Inspection Checklist

	Component	Observed Condition			Further Action Required	
		Excellent	Fair	Poor	Yes	No
1.0	**Landfill Cap:**					
	Vegetation		✓			✓
	Cap					✓
	Gas Vents	✓				✓
2.0	**Drainage Structures:**					
	Toe Drain	✓				✓
	Drainage Channels		✓			✓
	French Drains/Outfalls					✓
	Subsurface Drainage Pipes/Outfalls	✓				✓
	Manholes					✓
	Recharge Areas	✓				✓
	Monitoring System:					
	Soil Gas Wells					
	Groundwater Wells	✓				✓
4.0	**Site Access:**					
	Asphalt Access Road		✓			
	Crushed-Concrete Access Road	✓				✓

B. Description of Further Action Requirements:

1. Location: Landfill, Drainage Channels, Road

Observed Conditions: Vegetation Growth

Recommendations: Continue to monitor and call Grounds to cut when needed

BROOKHAVEN NATIONAL LABORATORY
CURRENT LANDFILL AREA
SITE INSPECTION FORM

Name of Inspector(s): Eric Kramer

Date of Inspection: 6-20-19
Purpose of Inspection: ✓ Routine ___ Heavy Rainfall ___ Reported Incident
Time on Site: ___ ___
Time off Site: ___ ___
Weather Conditions: ___

A. Inspection Checklist

	Component	Observed Condition			Further Action Required	
		Excellent	Fair	Poor	Yes	No
1.0	**Landfill Cap:**					
	Vegetation	✓	✓		✓	✓
	Cap	✓				✓
	Gas Vents	✓				✓
2.0	**Drainage Structures:**					
	Toe Drain	✓				✓
	Drainage Channels		✓		✓	
	French Drains/Outfalls	✓				✓
	Subsurface Drainage Pipes/Outfalls		✓		✓	
	Manholes	✓				✓
	Recharge Areas	✓				✓
	Monitoring System:					
	Soil Gas Wells	✓				✓
	Groundwater Wells	✓				✓
4.0	**Site Access:**					
	Asphalt Access Road		✓		✓	
	Crushed-Concrete Access Road	✓				✓

B. Description of Further Action Requirements:

1. Location: Road, Drainage channels, Land Fill
Observed Conditions: Animal Burrow, Excessive Vegetation

Recommendations: Will Contact Grounds to Fill in Animal Burrow And For Vegetation Removal

BROOKHAVEN NATIONAL LABORATORY
LTRA SITE INSPECTION FORM

Location (AOC): Current Landfill and Wooded Wetland
Date of Inspection: 6/20/19
Name of Inspector(s): R. Howe, W. Dorsch, E. Kramer, V. Racaniello, L. Singh
Purpose of Inspection: ☒ Routine (Scheduled Frequency of 2x/yr) ☐ Heavy Rainfall ☐ Reported Incident

A. Inspection Checklist

Component	Observed Condition				Further Action Req'd	
	Excell.	Fair	Poor	Not Applic.	Yes (describe)	No
1. Landfill Cap/Soil Covers/Wetlands:						
Vegetation (e.g. grass)	X				Grass partially cut	
Soil (Cap/Cover/Fill)	X				1 burrow needs repair	
Other:						
2. Drainage Structures:						
Standing Water	X				None	X
Toe Drain	X					X
Drainage Channels		X			Some veg. in channels	X
French Drains/Outfalls				X		X
Subsurface Drainage Pipes/Outfalls		X				X
Manholes				X		X
Berms				X		X
Roof Drains				X		X
Recharge Areas	X					X
Other:						
3. Monitoring System:						
Soil Gas Wells	X				Need weed whacked	
Groundwater Wells	X				Locked	X
Gas Vents	X					X
Other: __						
4. Site Access:						
Asphalt Access Road	X				Grass in cracks	X
Crushed-concrete Access Road				X		X
Fence	X					X
Gates/locks	X				Gates locked	X
LUIC Signs	X				3 signs in place	X
Other: Stairs access to cap	X				Good condition	X

5. Evidence of unauthorized work activities and/or unauthorized access has occurred? ☐ Yes ☒ No
If yes, describe evidence: _

B. Description of Other Observations

Observed Conditions/Recommendations: The grass on the cap was cut in early June but only on a portion of the slopes. Still need the top cut. Could not walk the top of the landfill due to overgrown grass. One active animal burrow was present on the southeast slope. The burrow is ~ 18" deep but doesn't penetrate past the protective layer. Facilities and Operations were notified 6/25/19 that it needs to be filled-in. All three point of contact signs are in place and gates locked. The Wooded Wetland has significant water present. LUIC Factsheet Changes: No changes for Current Landfill or Wooded Wetlands.

BROOKHAVEN NATIONAL LABORATORY
CURRENT LANDFILL AREA
SITE INSPECTION FORM

Name of Inspector(s): Eric Kramer

Date of Inspection: 7-30-19

Purpose of Inspection: ✓ Routine ___ Heavy Rainfall ___ Reported Incident

Time on Site: ___ ___

Time off Site: ___ ___

Weather Conditions: ___

A. Inspection Checklist

	Component	Observed Condition			Further Action Required	
		Excellent	Fair	Poor	Yes	No
1.0	**Landfill Cap:**					
	Vegetation	✓				✓
	Cap					✓
	Gas Vents	✓				✓
2.0	**Drainage Structures:**					
	Toe Drain	✓				✓
	Drainage Channels		✓		✓	
	French Drains/Outfalls	✓				✓
	Subsurface Drainage Pipes/Outfalls	✓				✓
	Manholes	✓				✓
	Recharge Areas					
	Monitoring System:					
	Soil Gas Wells	✓				✓
	Groundwater Wells	✓				✓
4.0	**Site Access:**					
	Asphalt Access Road		✓			
	Crushed-Concrete Access Road	✓			✓	

B. Description of Further Action Requirements:

1. Location: Drainage Channels, Asphalt Road

Observed Conditions: Excess Vegetation

Recommendations: Monitor & Have Removed at End of Season.

NOTE: Animal Burrow Filled in. Landfill Mowed

BROOKHAVEN NATIONAL LABORATORY
CURRENT LANDFILL AREA
SITE INSPECTION FORM

Name of Inspector(s): Eric Kramer

Date of Inspection: 8-28-19

Purpose of Inspection: X Routine ___ Heavy Rainfall ___ Reported Incident

Time on Site: ___ ___

Time off Site: ___ ___

Weather Conditions: ___

A. Inspection Checklist

	Component	Observed Condition			Further Action Required	
		Excellent	Fair	Poor	Yes	No
1.0	**Landfill Cap:**					
	Vegetation	✓				✓
	Cap	✓				✓
	Gas Vents	✓				✓
2.0	**Drainage Structures:**					
	Toe Drain	✓				✓
	Drainage Channels		✓		✓	
	French Drains/Outfalls	✓				✓
	Subsurface Drainage Pipes/Outfalls	✓				✓
	Manholes	✓				✓
	Recharge Areas	✓				✓
	Monitoring System:					
	Soil Gas Wells	✓				✓
	Groundwater Wells	✓				✓
4.0	**Site Access:**					
	Asphalt Access Road		✓		✓	
	Crushed-Concrete Access Road	✓				✓

B. Description of Further Action Requirements:

1. Location: Drainage Channel & Road

Observed Conditions: Excess Vegetation

Recommendations: Remove Excess Vegetation at end of Growing Season

BROOKHAVEN NATIONAL LABORATORY
CURRENT LANDFILL AREA
SITE INSPECTION FORM

Name of Inspector(s): Eric Kramer

Date of Inspection: 9-26-19

Purpose of Inspection: ✓ Routine ___ Heavy Rainfall ___ Reported Incident

Time on Site: ___

Time off Site: ___

Weather Conditions: ___

A. Inspection Checklist

	Component	Observed Condition: Excellent	Fair	Poor	Further Action Required: Yes	No
1.0	**Landfill Cap:**					
	Vegetation		✓		✓	
	Cap	✓				✓
	Gas Vents	✓				✓
2.0	**Drainage Structures:**					
	Toe Drain					
	Drainage Channels		✓			✓
	French Drains/Outfalls	✓			✓	
	Subsurface Drainage Pipes/Outfalls					
	Manholes	✓				✓
	Recharge Areas	✓				✓
	Monitoring System:					
	Soil Gas Wells					
	Groundwater Wells	✓				✓
4.0	**Site Access:**					
	Asphalt Access Road		✓			
	Crushed-Concrete Access Road	✓			✓	

B. Description of Further Action Requirements:

1. Location: CAP, Drainage Channels, Road

Observed Conditions: Excess Vegetation Growth

Recommendations: Will Contact Grounds Next Month For Vegetation Removal

BROOKHAVEN NATIONAL LABORATORY
CURRENT LANDFILL AREA
SITE INSPECTION FORM

Name of Inspector(s): Eric Kramer

Date of Inspection: 10-30-19
Purpose of Inspection: ✓ Routine ___ Heavy Rainfall ___ Reported Incident
Time on Site: ___
Time off Site: ___
Weather Conditions: ___

A. Inspection Checklist

	Component	Observed Condition			Further Action Required	
		Excellent	Fair	Poor	Yes	No
1.0	**Landfill Cap:**					
	Vegetation		✓		✓	
	Cap					✓
	Gas Vents	✓				✓
2.0	**Drainage Structures:**					
	Toe Drain	✓			✓	
	Drainage Channels		✓			✓
	French Drains/Outfalls	✓				✓
	Subsurface Drainage Pipes/Outfalls	✓				✓
	Manholes	✓				✓
	Recharge Areas	✓				✓
	Monitoring System:					
	Soil Gas Wells	✓				✓
	Groundwater Wells	✓				✓
4.0	**Site Access:**					
	Asphalt Access Road		✓		✓	
	Crushed-Concrete Access Road	✓				✓

B. Description of Further Action Requirements:

1. Location: Drainage channels, Road
Observed Conditions: Grounds cut Landfill Grass this Month
Some Excess Vegetation in Drainage Channels and on Road
Recommendations: Have grounds remove Excess Vegetation in Spring

BROOKHAVEN NATIONAL LABORATORY
LTRA SITE INSPECTION FORM

Location (AOC): Current Landfill and Wooded Wetland
Date of Inspection: 11/21/19
Name of Inspector(s): R. Howe, W. Dorsch, V. Racaniello, L. Singh. K. Schwager
Purpose of Inspection: ☒ Routine (Scheduled Frequency of 2x/yr) ☐ Heavy Rainfall ☐ Reported Incident

A. Inspection Checklist

Component	Observed Condition				Further Action Req'd	
	Excell.	Fair	Poor	Not Applic.	Yes (describe)	No
1. Landfill Cap/Soil Covers/Wetlands:						
Vegetation (e.g. grass)	X				Grass cut in Oct	X
Soil (Cap/Cover/Fill)	X				Burrows need repair	
Other: _____						
2. Drainage Structures:						
Standing Water	X				None	X
Toe Drain	X					X
Drainage Channels		X			Little veg. in channels	X
French Drains/Outfalls				X		X
Subsurface Drainage Pipes/Outfalls		X				X
Manholes				X		X
Berms				X		X
Roof Drains				X		X
Recharge Areas	X					X
Other: _____						
3. Monitoring System:						
Soil Gas Wells	X				Recently cleared	X
Groundwater Wells	X				Locked	X
Gas Vents	X					X
Other: __						
4. Site Access:						
Asphalt Access Road	X					X
Crushed-concrete Access Road				X		X
Fence	X					X
Gates/locks	X				Gates locked	X
LUIC Signs	X				3 signs in place	X
Other: Stairs access to cap	X					X

5. Evidence of unauthorized work activities and/or unauthorized access has occurred? ☐ Yes ☒ No
If yes, describe evidence: _ _____

B. Description of Other Observations

Observed Conditions/Recommendations: The grass on the cap was cut in October. Cap was slightly spongy only on top. There were active and inactive animal burrows present on the west, south and southeast slopes. Facilities and Operations were notified 11/21/19 that they need to be filled-in. All three point of contact signs are in place and gates locked. The Wooded Wetland has water present. LUIC Factsheet Changes: No changes for Current Landfill or Wooded Wetlands.

BROOKHAVEN NATIONAL LABORATORY
CURRENT LANDFILL AREA
SITE INSPECTION FORM

Name of Inspector(s): Eric Kramer

Date of Inspection: 11-26-19

Purpose of Inspection: ✓ Routine ___ Heavy Rainfall ___ Reported Incident

Time on Site: ___ ___

Time off Site: ___ ___

Weather Conditions: ___

A. Inspection Checklist

	Component	Observed Condition			Further Action Required	
		Excellent	Fair	Poor	Yes	No
1.0	**Landfill Cap:**					
	Vegetation	✓				✓
	Cap	✓				✓
	Gas Vents	✓				✓
2.0	**Drainage Structures:**					
	Toe Drain	✓				✓
	Drainage Channels	✓				✓
	French Drains/Outfalls	✓				✓
	Subsurface Drainage Pipes/Outfalls	✓				✓
	Manholes	✓				✓
	Recharge Areas	✓				✓
	Monitoring System:					
	Soil Gas Wells	✓				✓
	Groundwater Wells	✓				✓
4.0	**Site Access:**					
	Asphalt Access Road	✓				✓
	Crushed-Concrete Access Road	✓				✓

B. Description of Further Action Requirements:

1. Location: All OK. Vegetation not growing anymore for winter

Observed Conditions: ___

Recommendations: ___

BROOKHAVEN NATIONAL LABORATORY
CURRENT LANDFILL AREA
SITE INSPECTION FORM

Name of Inspector(s): Eric Kramer

Date of Inspection: 12-19-19

Purpose of Inspection: ✓ Routine ___ Heavy Rainfall ___ Reported Incident

Time on Site: ___ ___

Time off Site: ___ ___

Weather Conditions: ___

A. Inspection Checklist

	Component	Observed Condition			Further Action Required	
		Excellent	Fair	Poor	Yes	No
1.0	**Landfill Cap:**					
	Vegetation	✓				✓
	Cap	✓				✓
	Gas Vents	✓				✓
2.0	**Drainage Structures:**					
	Toe Drain	✓				✓
	Drainage Channels	✓				✓
	French Drains/Outfalls	✓				✓
	Subsurface Drainage Pipes/Outfalls	✓				✓
	Manholes	✓				✓
	Recharge Areas	✓				✓
	Monitoring System:					
	Soil Gas Wells	✓				✓
	Groundwater Wells	✓				✓
4.0	**Site Access:**					
	Asphalt Access Road	✓				✓
	Crushed-Concrete Access Road	✓				✓

B. Description of Further Action Requirements:

1. Location: All OK.

Observed Conditions: ___

Recommendations: ___

BROOKHAVEN NATIONAL LABORATORY
FORMER LANDFILL AREA
SITE INSPECTION FORM

Name of Inspector(s): Eric Kramer

Date of Inspection: 1-29-19

Purpose of Inspection: X Routine ___ Heavy Rainfall ___ Reported Incident

Time on Site:

Time off Site:

Weather Conditions:

A. Inspection Checklist

Component		Observed Condition			Further Action Required	
		Excellent	Fair	Poor	Yes	No
1.0	**Landfill Cap:**					
	Vegetation	X				X
	Cap	X				X
	Gas Vents	X				X
2.0	**Drainage Structures:**					
	Toe Drain	X				X
	Drainage Channels	X				X
	French Drains/Outfalls	X				X
	Subsurface Drainage Pipes/Outfalls	X				X
	Manholes	X				X
	Recharge Areas	X				X
3.0	**Monitoring System:**					
	Soil Gas Wells	X				X
	Groundwater Wells	X				X
4.0	**Site Access:**					
	Asphalt Access Road	X				X
	Crushed-Concrete Access Road	X				X

B. Description of Further Action Requirements:

1. Location: All OK

Observed Conditions:

Recommendations:

BROOKHAVEN NATIONAL LABORATORY
FORMER LANDFILL AREA
SITE INSPECTION FORM

Name of Inspector(s): Eric Kramer

Date of Inspection: 2-26-19
Purpose of Inspection: ✓ Routine ___ Heavy Rainfall ___ Reported Incident
Time on Site:
Time off Site:
Weather Conditions:

A. Inspection Checklist

	Component	Observed Condition			Further Action Required	
		Excellent	Fair	Poor	Yes	No
1.0	**Landfill Cap:**					
	Vegetation	✓				✓
	Cap	✓				✓
	Gas Vents	✓				✓
2.0	**Drainage Structures:**					
	Toe Drain	✓				✓
	Drainage Channels	✓				✓
	French Drains/Outfalls	✓				✓
	Subsurface Drainage Pipes/Outfalls	✓				✓
	Manholes	✓				✓
	Recharge Areas	✓				✓
3.0	**Monitoring System:**					
	Soil Gas Wells	✓				✓
	Groundwater Wells	✓				✓
4.0	**Site Access:**					
	Asphalt Access Road	✓				✓
	Crushed-Concrete Access Road	✓				✓

B. Description of Further Action Requirements:

1. Location: All OK
Observed Conditions:

Recommendations:

BROOKHAVEN NATIONAL LABORATORY
FORMER LANDFILL AREA
SITE INSPECTION FORM

Name of Inspector(s): Eric Kramer

Date of Inspection: 3-28-19

Purpose of Inspection: ✓ Routine ___ Heavy Rainfall ___ Reported Incident

Time on Site:

Time off Site:

Weather Conditions:

A. Inspection Checklist

Component		Observed Condition			Further Action Required	
		Excellent	Fair	Poor	Yes	No
1.0	**Landfill Cap:**					
	Vegetation	✓				✓
	Cap	✓				✓
	Gas Vents	✓				✓
2.0	**Drainage Structures:**					
	Toe Drain	✓				✓
	Drainage Channels	✓				✓
	French Drains/Outfalls	✓				✓
	Subsurface Drainage Pipes/Outfalls	✓				✓
	Manholes	✓				✓
	Recharge Areas	✓				✓
3.0	**Monitoring System:**					
	Soil Gas Wells	✓				✓
	Groundwater Wells	✓				✓
4.0	**Site Access:**					
	Asphalt Access Road	✓				
	Crushed-Concrete Access Road	✓				✓

B. Description of Further Action Requirements:

1. Location: All OK

Observed Conditions:

Recommendations:

BROOKHAVEN NATIONAL LABORATORY
FORMER LANDFILL AREA
SITE INSPECTION FORM

Name of Inspector(s): Eric Kramer

Date of Inspection: 4-25-19
Purpose of Inspection: ✓ Routine ___ Heavy Rainfall ___ Reported Incident
Time on Site:
Time off Site:
Weather Conditions:

A. Inspection Checklist

	Component	Observed Condition			Further Action Required	
		Excellent	Fair	Poor	Yes	No
1.0	**Landfill Cap:**					
	Vegetation		✓			✓
	Cap	✓				✓
	Gas Vents	✓				✓
2.0	**Drainage Structures:**					
	Toe Drain	✓				✓
	Drainage Channels		✓			✓
	French Drains/Outfalls	✓				✓
	Subsurface Drainage Pipes/Outfalls	✓				✓
	Manholes	✓				✓
	Recharge Areas	✓				✓
3.0	**Monitoring System:**					
	Soil Gas Wells	✓				✓
	Groundwater Wells	✓				✓
4.0	**Site Access:**					
	Asphalt Access Road		✓			✓
	Crushed-Concrete Access Road	✓				✓

B. Description of Further Action Requirements:

1. Location: Road, Landfill, Drainage Channels
Observed Conditions: Some Excess Vegitation

Recommendations: Monitor, Will Call Grounds When Needed for Vegetation Removal

BROOKHAVEN NATIONAL LABORATORY
FORMER LANDFILL AREA
SITE INSPECTION FORM

Name of Inspector(s): Eric Kramer

Date of Inspection: 5-29-19
Purpose of Inspection: ✓ Routine ___ Heavy Rainfall ___ Reported Incident
Time on Site:
Time off Site:
Weather Conditions:

A. Inspection Checklist

	Component	Observed Condition			Further Action Required	
		Excellent	Fair	Poor	Yes	No
1.0	**Landfill Cap:**					
	Vegetation		✓			
	Cap	✓				
	Gas Vents	✓				
2.0	**Drainage Structures:**					
	Toe Drain	✓				
	Drainage Channels		✓			
	French Drains/Outfalls	✓				
	Subsurface Drainage Pipes/Outfalls	✓				
	Manholes	✓				
	Recharge Areas	✓				
3.0	**Monitoring System:**					
	Soil Gas Wells	✓				
	Groundwater Wells	✓				
4.0	**Site Access:**					
	Asphalt Access Road		✓			
	Crushed-Concrete Access Road	✓				

B. Description of Further Action Requirements:

1. Location: Road, Landfill, Drainage Channels
Observed Conditions: Excess Vegetation Growth

Recommendations: ~~Con~~ Monitor and Contact Grounds to Remove Excess Vegetation

BROOKHAVEN NATIONAL LABORATORY
SITE INSPECTION FORM

Location (AOC): Former Landfill Area (includes the former and interim landfills and slit trench)
Date of Inspection: 6/25/19
Name of Inspector(s): R. Howe, E. Kramer, W. Dorsch, V. Racaniello, L. Singh, K. Schwager
Purpose of Inspection: ☒ Routine (Scheduled Frequency of 2x/yr) ☐ Heavy Rainfall ☐ Reported Incident

A. Inspection Checklist

Component	Observed Condition				Further Action Req'd	
	Excell.	Fair	Poor	Not Applic.	Yes (describe)	No
1. Landfill Cap/Soil Covers/Wetlands:						
Vegetation (e.g. grass)	X				Grass cut in early June	X
Soil (Cap/Cover/Fill)		X			Two burrows need fill	
Other: _____						
2. Drainage Structures:						
Standing Water	X				Cap is spongy, puddles	X
Toe Drain	X					X
Drainage Channels		X			Need vegetation removal	
French Drains/Outfalls	X					X
Subsurface Drainage Pipes/Outfalls	X					X
Manholes				X		X
Berms				X		X
Roof Drains				X		X
Recharge Areas	X				Significant vegetation	X
Other: _____						
3. Monitoring System:						
Soil Gas Wells		X			Need weed whacking	
Groundwater Wells	X					X
Gas Vents	X				Repair bent/broke vent	
Other: _____	X					X
4. Site Access:						
Asphalt Access Road		X			Settling at Interim LF	X
Crushed-concrete Access Road		X				X
Fence				X		X
Gates/locks				X		X
Radiological Postings				X		X
Other: LUIC Signs		X			4 signs in place	X

5. Evidence of unauthorized work activities and/or unauthorized access has occurred? ☐ Yes ☒ No
If yes, describe evidence: _____
_____

B. Description of Other Observations

Observed Conditions/Recommendations: Former Landfill, Interim Landfill, and Slit Trench caps are in good condition with no erosion evident. The grass was cut in early June and the Former Landfill cap was spongy due to recent rains. One of the soil gas vents on the Former Landfill was found bent over and most likely broken beneath the ground surface. May have been due to a mower/tractor cutting the grass. The drilling contractor will be contacted to perform repairs. There were two woodchuck burrows observed on the west slope that need to be filled-in. Vegetation in the drainage channels need to be cut or sprayed as well as removal of a pine seedling growing on the slopes of the Interim Landfill. Grass around soil gas wells need to be weed whacked. Facilities and Operations was informed of the need repairs 6/26/19. LUIC Factsheet Changes: None.

BROOKHAVEN NATIONAL LABORATORY
FORMER LANDFILL AREA
SITE INSPECTION FORM

Name of Inspector(s): Eric Kramer

Date of Inspection: 6-25-19
Purpose of Inspection: ✓ Routine ___ Heavy Rainfall ___ Reported Incident
Time on Site:
Time off Site:
Weather Conditions:

A. Inspection Checklist

	Component	Observed Condition			Further Action Required	
		Excellent	Fair	Poor	Yes	No
1.0	**Landfill Cap:**					
	Vegetation	✓				✓
	Cap		✓		✓	
	Gas Vents					✓
2.0	**Drainage Structures:**					
	Toe Drain	✓				✓
	Drainage Channels		✓		✓	
	French Drains/Outfalls	✓				✓
	Subsurface Drainage Pipes/Outfalls	✓				✓
	Manholes	✓				✓
	Recharge Areas	✓				✓
3.0	**Monitoring System:**					
	Soil Gas Wells		✓		✓	
	Groundwater Wells	✓				✓
4.0	**Site Access:**					
	Asphalt Access Road		✓			
	Crushed-Concrete Access Road		✓		✓	

B. Description of Further Action Requirements:

1. Location: Landfill, Drainage Channels, Roads
Observed Conditions:
Animal Burrows in Landfill, Broken Vent Pipe
Excessive Vegetation in channels & Road

Recommendations:
Contact Grounds to Fill in Burrows and Remove Excess Vegetation.
Hire Contractor to repair Vent Pipe

BROOKHAVEN NATIONAL LABORATORY
FORMER LANDFILL AREA
SITE INSPECTION FORM

Name of Inspector(s): Eric Kramer

Date of Inspection: 7-30-19

Purpose of Inspection: X Routine ___ Heavy Rainfall ___ Reported Incident

Time on Site:

Time off Site:

Weather Conditions:

A. Inspection Checklist

	Component	Observed Condition			Further Action Required	
		Excellent	Fair	Poor	Yes	No
1.0	**Landfill Cap:**					
	Vegetation	✓				✓
	Cap	✓				✓
	Gas Vents	✓				✓
2.0	**Drainage Structures:**					
	Toe Drain	✓			✓	
	Drainage Channels		✓			✓
	French Drains/Outfalls	✓				✓
	Subsurface Drainage Pipes/Outfalls	✓				✓
	Manholes	✓				✓
	Recharge Areas	✓				✓
3.0	**Monitoring System:**					
	Soil Gas Wells	✓				✓
	Groundwater Wells	✓				✓
4.0	**Site Access:**					
	Asphalt Access Road		✓			
	Crushed-Concrete Access Road	✓			✓	

B. Description of Further Action Requirements:

1. Location: Drainage Channels & Road

Observed Conditions: Excess Vegetation

Recommendations: Remove Vegetation at end of Growing Season

Note: Animal Burrow Filled in and Vent Pipe Repaired

BROOKHAVEN NATIONAL LABORATORY
FORMER LANDFILL AREA
SITE INSPECTION FORM

Name of Inspector(s): Eric Kramer

Date of Inspection: 8-28-19

Purpose of Inspection: X Routine ___ Heavy Rainfall ___ Reported Incident

Time on Site:

Time off Site:

Weather Conditions:

A. Inspection Checklist

	Component	Observed Condition			Further Action Required	
		Excellent	Fair	Poor	Yes	No
1.0	**Landfill Cap:**					
	Vegetation	✓				✓
	Cap	✓				✓
	Gas Vents	✓				✓
2.0	**Drainage Structures:**					
	Toe Drain	✓				✓
	Drainage Channels		✓		✓	
	French Drains/Outfalls	✓				✓
	Subsurface Drainage Pipes/Outfalls	✓				✓
	Manholes	✓				✓
	Recharge Areas	✓				✓
3.0	**Monitoring System:**					
	Soil Gas Wells	✓				✓
	Groundwater Wells	✓				✓
4.0	**Site Access:**					
	Asphalt Access Road		✓			
	Crushed-Concrete Access Road	✓			✓	

B. Description of Further Action Requirements:

1. Location: Drainage Channel to Road

Observed Conditions: Excess Vegetation

Recommendations: Remove Vegetation at End of Growing Season

BROOKHAVEN NATIONAL LABORATORY
FORMER LANDFILL AREA
SITE INSPECTION FORM

Name of Inspector(s): Eric Kramer

Date of Inspection: 9-26-19

Purpose of Inspection: ___ Routine ___ Heavy Rainfall ___ Reported Incident

Time on Site: _____

Time off Site: _____

Weather Conditions: _____

A. Inspection Checklist

	Component	Observed Condition			Further Action Required	
		Excellent	Fair	Poor	Yes	No
1.0	**Landfill Cap:**					
	Vegetation		✓			
	Cap	✓			✓	
	Gas Vents					✓
2.0	**Drainage Structures:**					
	Toe Drain	✓				
	Drainage Channels		✓		✓	
	French Drains/Outfalls	✓				✓
	Subsurface Drainage Pipes/Outfalls	✓				✓
	Manholes	✓				✓
	Recharge Areas	✓				✓
3.0	**Monitoring System:**					
	Soil Gas Wells	✓				✓
	Groundwater Wells	✓				✓
4.0	**Site Access:**					
	Asphalt Access Road	✓				✓
	Crushed-Concrete Access Road	✓				✓

B. Description of Further Action Requirements:

1. Location: CAP, Drainage Channels

Observed Conditions: Excess Vegetation Growth

Recommendations: Will Contact Grounds Next Month For Vegetation Removal

BROOKHAVEN NATIONAL LABORATORY
FORMER LANDFILL AREA
SITE INSPECTION FORM

Name of Inspector(s): Eric Kramer

Date of Inspection: 10-30-19

Purpose of Inspection: ___ Routine ___ Heavy Rainfall ___ Reported Incident

Time on Site:

Time off Site:

Weather Conditions:

A. Inspection Checklist

	Component	Observed Condition			Further Action Required	
		Excellent	Fair	Poor	Yes	No
1.0	**Landfill Cap:**					
	Vegetation		✓			
	Cap	✓			✓	
	Gas Vents	✓				✓
2.0	**Drainage Structures:**					
	Toe Drain	✓				✓
	Drainage Channels		✓		✓	
	French Drains/Outfalls	✓				✓
	Subsurface Drainage Pipes/Outfalls	✓				✓
	Manholes	✓				✓
	Recharge Areas	✓				✓
3.0	**Monitoring System:**					
	Soil Gas Wells	✓				✓
	Groundwater Wells	✓				
4.0	**Site Access:**					
	Asphalt Access Road	✓				✓
	Crushed-Concrete Access Road	✓				✓

B. Description of Further Action Requirements:

1. Location: Drainage Channels

Observed Conditions: LANDFILL CAP GRASS CUT THIS MONTH

SOME EXCESS VEGETATION IN DRAINAGE CHANNEL

Recommendations: WILL CONTACT GROUNDS TO REMOVE EXCESS VEGETATION IN SPRING

BROOKHAVEN NATIONAL LABORATORY
SITE INSPECTION FORM

Location (AOC): Former Landfill Area (includes the former and interim landfills and slit trench)
Date of Inspection: 11/15/19
Name of Inspector(s): R. Howe, W. Dorsch, L. Singh, M. Longpre
Purpose of Inspection: ☒ Routine (Scheduled Frequency of 2x/yr) ☐ Heavy Rainfall ☐ Reported Incident

A. Inspection Checklist

Component	Observed Condition				Further Action Req'd	
	Excell.	Fair	Poor	Not Applic.	Yes (describe)	No
1. Landfill Cap/Soil Covers/Wetlands:						
Vegetation (e.g. grass)	X				Grass cut in October	X
Soil (Cap/Cover/Fill)		X			One burrow needs fill	
Other: _____						
2. Drainage Structures:						
Standing Water	X				Cap spongy, minor ruts	X
Toe Drain	X					X
Drainage Channels		X			Need vegetation removal	
French Drains/Outfalls	X					X
Subsurface Drainage Pipes/Outfalls	X					X
Manholes				X		X
Berms				X		X
Roof Drains				X		X
Recharge Areas	X				Significant vegetation	X
Other: _____						
3. Monitoring System:						
Soil Gas Wells	X					X
Groundwater Wells	X					X
Gas Vents	X				Vent pipe repaired	X
Other: _____	X					X
4. Site Access:						
Asphalt Access Road		X				X
Crushed-concrete Access Road		X				X
Fence				X		X
Gates/locks				X		X
Radiological Postings				X		X
Other: LUIC Signs		X			4 signs in place	X

5. Evidence of unauthorized work activities and/or unauthorized access has occurred? ☐ Yes ☒ No
If yes, describe evidence: _____
_____

B. Description of Other Observations

Observed Conditions/Recommendations: Former Landfill, Interim Landfill, and Slit Trench caps are in good condition with no erosion evident. The grass was cut in October and the Former Landfill cap was spongy. The damaged soil gas vent on the Former Landfill was repaired in August 2018. There was one woodchuck burrow observed on the west slope that need to be filled-in. Small pine trees in the west drainage channel of the Former Landfill and in the south trench of the Interim Landfill need to be cut. Facilities and Operations was informed of the need repairs 11/15/19. LUIC Factsheet Changes: None.

BROOKHAVEN NATIONAL LABORATORY
FORMER LANDFILL AREA
SITE INSPECTION FORM

Name of Inspector(s): Eric Kramer

Date of Inspection: 11-26-19

Purpose of Inspection: ✓ Routine ___ Heavy Rainfall ___ Reported Incident

Time on Site: _____

Time off Site: _____

Weather Conditions: _____

A. Inspection Checklist

	Component	Observed Condition			Further Action Required	
		Excellent	Fair	Poor	Yes	No
1.0	**Landfill Cap:**					
	Vegetation	✓				✓
	Cap	✓				✓
	Gas Vents	✓				✓
2.0	**Drainage Structures:**					
	Toe Drain	✓				✓
	Drainage Channels	✓				✓
	French Drains/Outfalls	✓				✓
	Subsurface Drainage Pipes/Outfalls	✓				✓
	Manholes	✓				✓
	Recharge Areas	✓				✓
3.0	**Monitoring System:**					
	Soil Gas Wells	✓				✓
	Groundwater Wells	✓				✓
4.0	**Site Access:**					
	Asphalt Access Road	✓				✓
	Crushed-Concrete Access Road	✓				✓

B. Description of Further Action Requirements:

1. Location: All OK. No Futher Vegetation growth due to winter

Observed Conditions: _____

Recommendations: _____

BROOKHAVEN NATIONAL LABORATORY
FORMER LANDFILL AREA
SITE INSPECTION FORM

Name of Inspector(s): Eric Kramer

Date of Inspection: 12-19-19

Purpose of Inspection: ✓ Routine ___ Heavy Rainfall ___ Reported Incident

Time on Site:

Time off Site:

Weather Conditions:

A. Inspection Checklist

	Component	Observed Condition			Further Action Required	
		Excellent	Fair	Poor	Yes	No
1.0	**Landfill Cap:**					
	Vegetation	✓				✓
	Cap	✓				✓
	Gas Vents	✓				✓
2.0	**Drainage Structures:**					
	Toe Drain	✓				✓
	Drainage Channels	✓				✓
	French Drains/Outfalls	✓				✓
	Subsurface Drainage Pipes/Outfalls	✓				✓
	Manholes	✓				✓
	Recharge Areas	✓				✓
3.0	**Monitoring System:**					
	Soil Gas Wells	✓				✓
	Groundwater Wells	✓				✓
4.0	**Site Access:**					
	Asphalt Access Road	✓				✓
	Crushed-Concrete Access Road	✓				✓

B. Description of Further Action Requirements:

1. Location: All OK

Observed Conditions:

Recommendations: